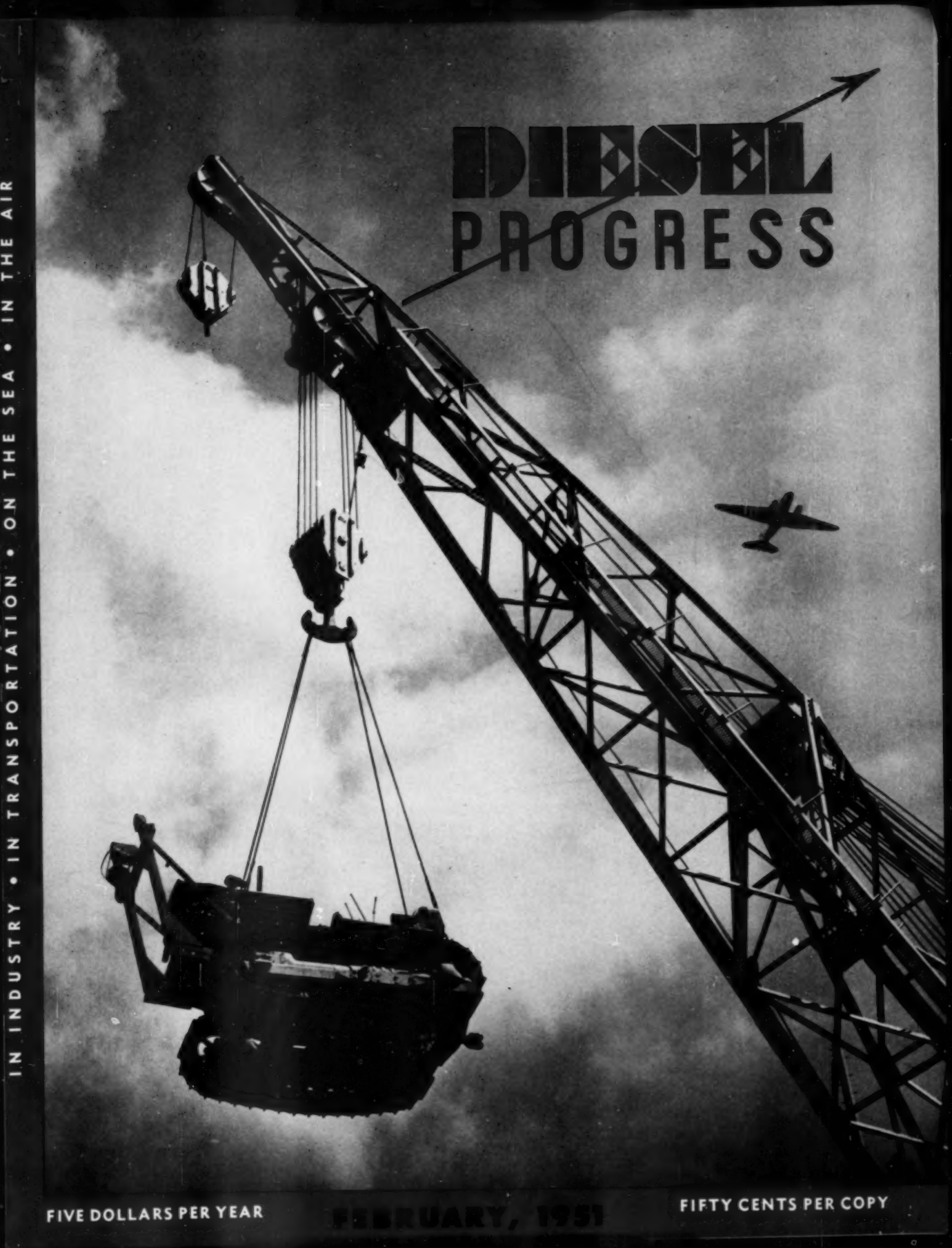
DIESEL
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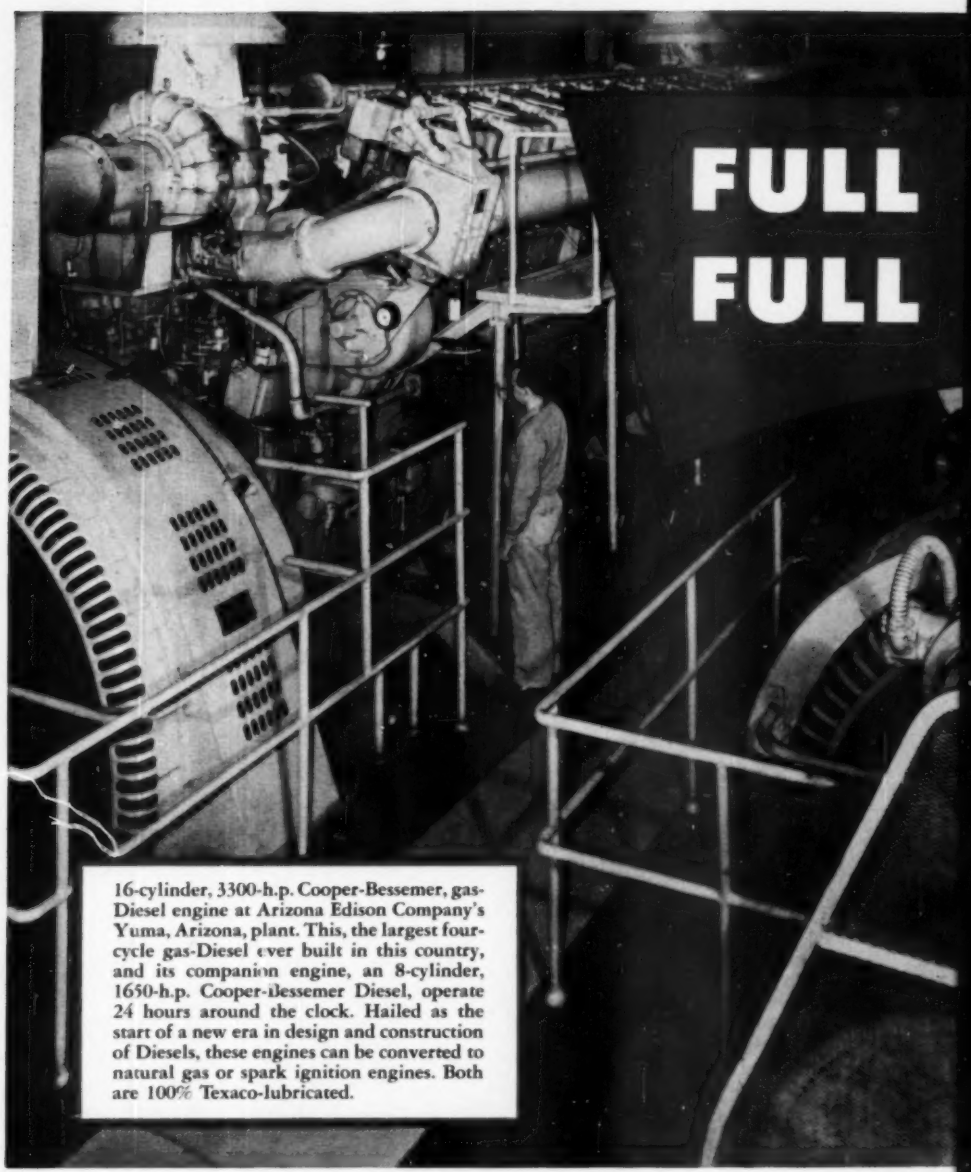

16-cylinder, 3300-h.p. Cooper-Bessemer, gas-Diesel engine at Arizona Edison Company's Yuma, Arizona, plant. This, the largest four-cycle gas-Diesel ever built in this country, and its companion engine, an 8-cylinder, 1650-h.p. Cooper-Bessemer Diesel, operate 24 hours around the clock. Hailed as the start of a new era in design and construction of Diesels, these engines can be converted to natural gas or spark ignition engines. Both are 100% Texaco-lubricated.

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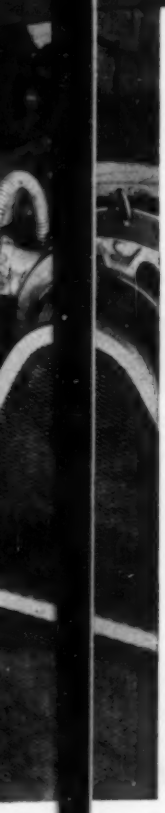
DIESEL PROGRESS for February, 1951, Volume XVII, Number 2. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 816 North La Cienega Boulevard, Los Angeles 46, California. Rex W. Wadman, President. Subscription rates: $5 per year, single copy 50c. Acceptance under 34.64, P. L. & R., authorized.

PROTECTION POWER...



...assured with TEXACO URSA OILS

LUBRICATE your engines—Diesel, gas or dual-fuel—with world-famous *Texaco Ursa Oils,* and you'll get full power with fuel economy. These fine oils keep your engines free from harmful carbon and sludge, keep rings free, ports open, and valves working properly. This means better compression and combustion.

Texaco Ursa Oils are especially resistant to oxidation and stand up under heat and pressure. They protect bearings from corrosion and assure longer life for all moving parts. You get trouble-free performance and lower maintenance costs.

Texaco Ursa Oils are available in proper viscosities for every need. Approved by leading Diesel manufacturers, they are easily America's No. 1 choice. In fact:

More stationary Diesel h.p. in the U. S. is lubricated with Texaco Ursa Oils than with any other brand.

A Texaco Lubrication Engineer will gladly help you in the proper and most economical selection of lubricants. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

Tie up to GM service

GM offers—to boatowners, to shipyards, to naval architects—prompt, courteous service and parts attention; installation and design data; and experienced, professional information. All this by sales and service representatives who are best able to serve you—and so conveniently located that they're never more than a few hours away!

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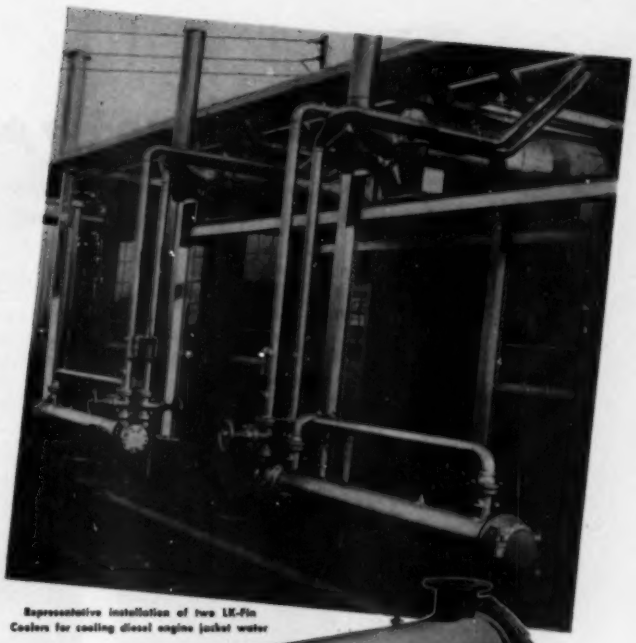
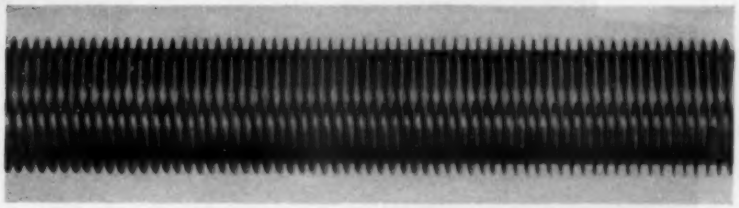
Why
LK-FIN
means a more effective...compact and economical
Lube Oil or Jacket Water Cooler



Representative installation of two LK-Fin Coolers for cooling diesel engine jacket water

Single-pass LK-Fin Cooler viewed from stationary head end



Portion of the helical-finned element used in the LK-Fin Cooler

It's because of the **fins** on the cooling elements. These fins greatly increase the external heat transfer surface . . . enable a considerably shorter tube to perform the same cooling effect that requires a much longer bare tube.

The results . . . a more compact cooler because of the more effective heat transfer surface . . . a more economical unit because of the shorter tubes and shell.

What diameter . . . thickness . . . pitch . . . should the fins be to accomplish these results? That's where G-R's unmatched know-how comes in . . . a knowledge gained from 20 years of experience in building **finned-type** heat exchangers and the results obtained from many tens of thousands of installed finned-tube units.

And the exclusive use of LK-Fin tubes is only one of the many distinctive features of these coolers. Write for bulletin describing them in detail, with rating tables and selection data.

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GR-562 B

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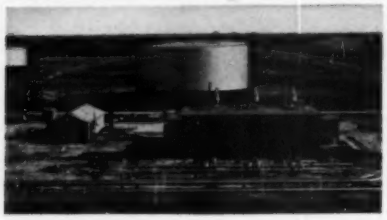
PIONEERS IN HEAT TRANSFER APPARATUS

Here's real pumping power for Pipe Lines

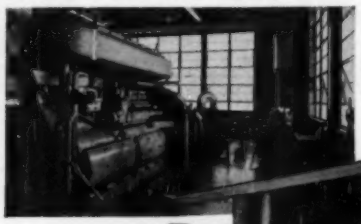
ALCO Diesel engine pumping installation at Patoka Station of The Texas-Empire Pipe Line Company System uses NO spare units.

Operation of these Alco diesels is so reliable that the Patoka Illinois Station uses no spare units—and yet must be ready at all times to pump vital crude oil by pipe line to refineries and connecting carriers. That's why Alco medium speed Diesels have been picked for the job. These dependable engines have operated 96% of the elapsed time at 94% of the manufacturer's rating, using centrifuged line crude for fuel. Operation is so reliable that the station uses no spare units. Such dependable performance is the chief reason why in the last ten years *more Alco Diesels have been installed in oil pipe line pumping service in the U. S. and Canada than any others.* For more details check now with American Locomotive Company, 30 Church Street, New York 7, or the nearest Alco Sales Office at Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady, St. Louis.

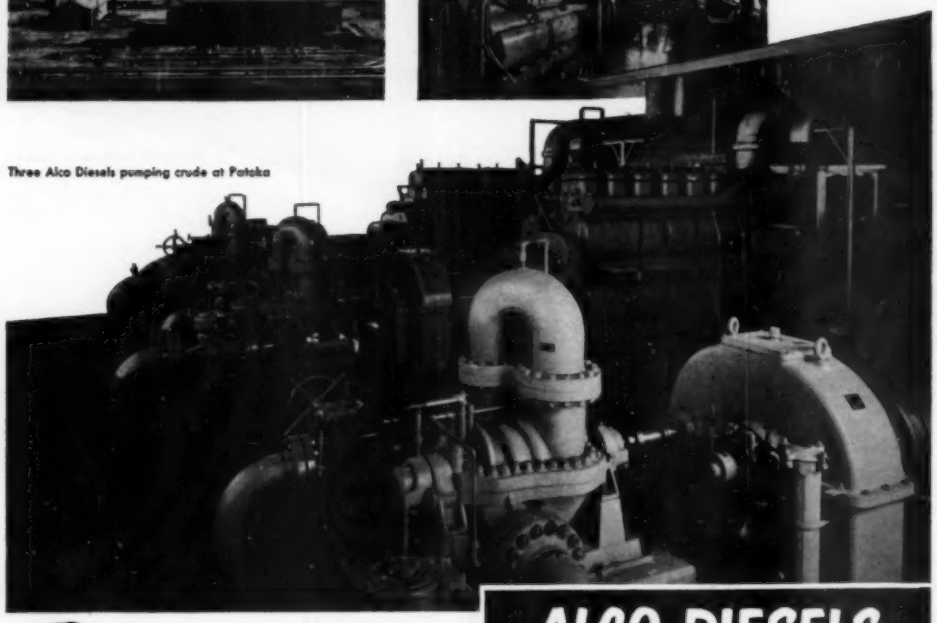
Outside view Patoka Pumping Station



Close-up view of one of the Alco Diesels at Patoka



Three Alco Diesels pumping crude at Patoka



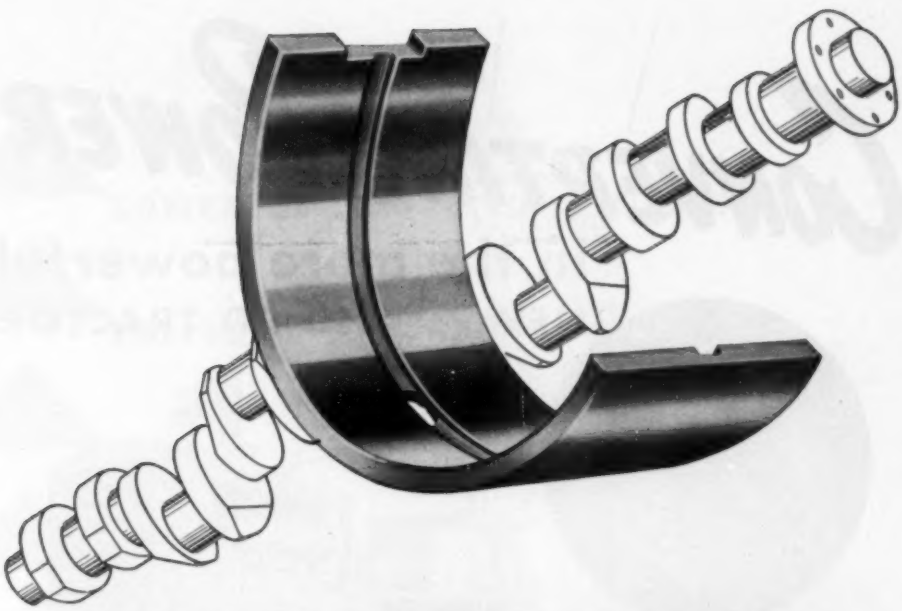
SPEED Vs. WEAR

Remember, since piston speed and journal travel per minute are both almost the same in medium speed and slow speed engines, wear is equivalent as well. Not only do you get unequalled dependability with Alco Diesels—you get long wear and low maintenance costs, no matter how difficult the service conditions.

ALCO DIESELS

THE MARK OF MODERN ENGINEERING

AMERICAN LOCOMOTIVE COMPANY



SHAFT HARDENING IS UNNECESSARY

WITH FEDERAL-MOGUL *Federaloy B-40* COPPER-LEAD BEARINGS

Through our special process for the production of cast copper-lead bearings we can now provide up to 40% lead content with excellent lead distribution. This means that you now can have a heavy-duty bearing combined with a soft shaft—and save the high cost of shaft hardening.

It also provides cast copper-lead bearings with high fatigue strength, imbedability and conformability characteristics. This type of bearing can "live" with a reasonable amount of unavoidable dirt in the engine and has excellent non-seizure properties.

Investigate the economies possible by eliminating shaft hardening and being able to combine a heavy-duty bearing with a soft shaft and much greater load-carrying capacity. Address: FEDERAL MOGUL CORPORATION, 11039 SHOEMAKER, DETROIT 13, MICHIGAN.

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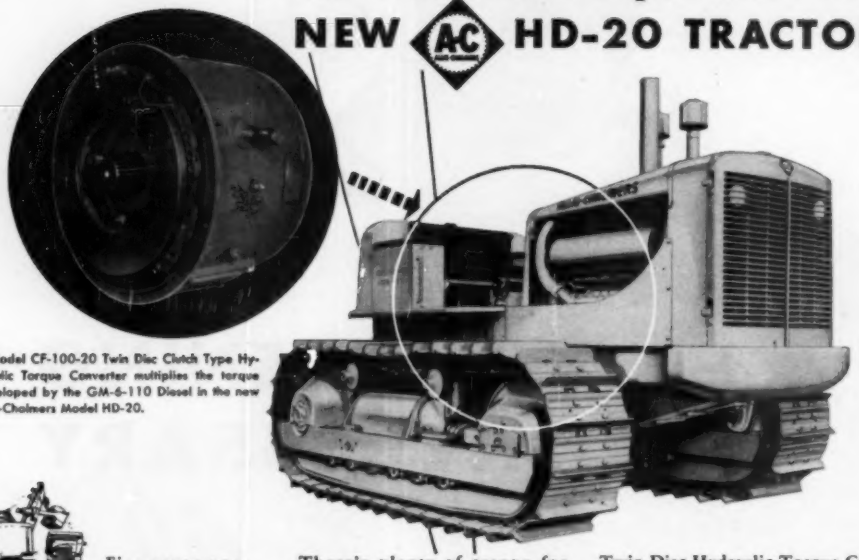
CONVERTING POWER

in the more powerful NEW A-C HD-20 TRACTOR



A Model CF-100-20 Twin Disc Clutch Type Hydraulic Torque Converter multiplies the torque developed by the GM-6-110 Diesel in the new Allis-Chalmers Model HD-20.

Five years ago, Allis-Chalmers introduced the nation's *first* tractor with power transmitted through a hydraulic torque converter. *The converter was a Twin Disc.*

Now, Allis-Chalmers introduces an even more powerful torque converter tractor, their new Model HD-20. *Again,* the torque converter is a Twin Disc.

There's plenty of reason for choosing a torque converter—virtual elimination of gear shift guesswork for the operator, the engine always turning at its most effective rpm, *automatic* and *instant* selection of the right power for the pull—plus absorption of shocks and jolts that otherwise would jar the drive line and engine.

And, there's even more reason for choosing Twin Disc. For the Twin Disc Hydraulic Torque Converter is the industrial torque converter which multiplies engine torque more than five times at stall.

That's why you find Twin Disc Torque Converters converting power in the new A-C HD-20, and in more and more other types of construction equipment, too. Write today for complete details. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin.

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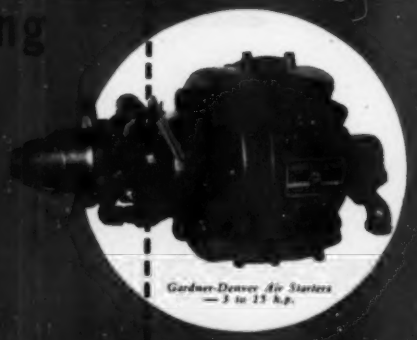
ENGINEERED TO ENDURE

FULTON

DIESELS---the best buy for the long run

FULTON IRON WORKS COMPANY
SAINT LOUIS 14, MISSOURI

1125 horses start pulling when this GARDNER-DENVER MIDGET says, "giddap"



Gardner-Denver Air Starters — 3 to 15 h.p.

Big diesels like this start easily and safely—every time—when they're equipped with Gardner-Denver Air Starters. These modern engine starting motors are packed with horsepower—ring relentlessly against high starting loads—respond promptly to feather-touch control.

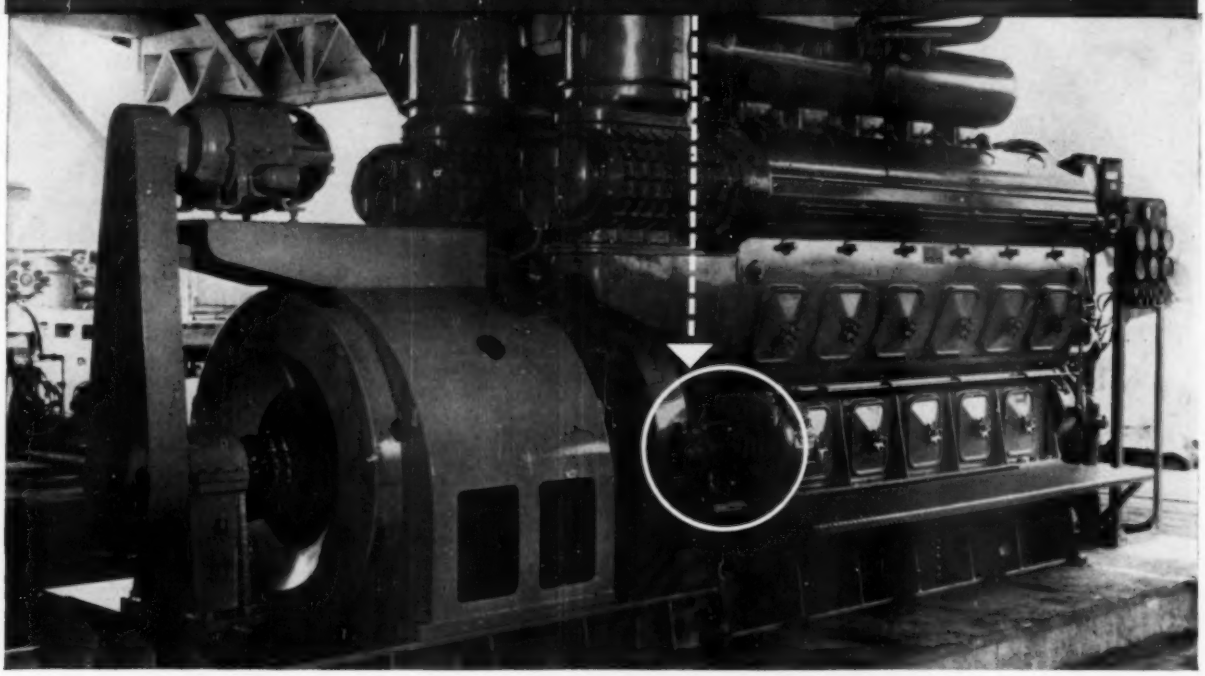
In addition, Gardner-Denver Air Starters . . .

. . . Engage the ring gear before power is applied to the pinion.

. . . Eliminate costly battery maintenance and replacement.

. . . Are available in sizes and gear ratios to meet your needs exactly.

Write for complete information and specifications.



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GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois

THE QUALITY LEADER IN PUMPS, COMPRESSORS, AND ROCK DRILLS

Is Your Service SEVERE?

Do your diesels have to handle frequent peak loads? Or operate continuously at high temperatures? Or have long idling periods? Then Sinclair GASCON OIL HD is the lubricant for you.

This heavy-duty, additive-type oil has increased cleansing and dispersion action, and resistance to oxidation. It inhibits deposits and ring-sticking; protects bearings from corrosion and is non-foaming. It keeps diesel engines clean despite punishing operating conditions and assures fuel and maintenance economy.

GASCON OIL HD in your diesels will pay dividends.

• • •

Diesel locomotives live a harder life than most stationary diesels—accelerating, slowing up, climbing grades . . . amid changing climatic conditions. GASCON* OIL HD has proven itself in this difficult service. It is used by over 60 of America's top railroads to protect their costly locomotive investment.

For lubrication counsel, see your nearest Sinclair Representative or write direct to Sinclair Refining Company, 630 Fifth Avenue, New York 20, N. Y.

SERVING THE DIESELS THAT SERVE AMERICA . . .

DELCO-REMY

On many a job indoors and out, it is Diesel power that pulls the load . . . turning the soil and the wheels of industry alike. And on many Diesel engines, electrical needs are supplied by Delco-Remy electrical equipment.

To producers and users of Diesel engines the name Delco-Remy stands for fine performance . . . to them it means Diesels on the job.

UNITED SERVICE MOTORS

DELCO-REMY—A UNITED MOTORS LINE
Service Parts and Delco Batteries
Available Everywhere Through
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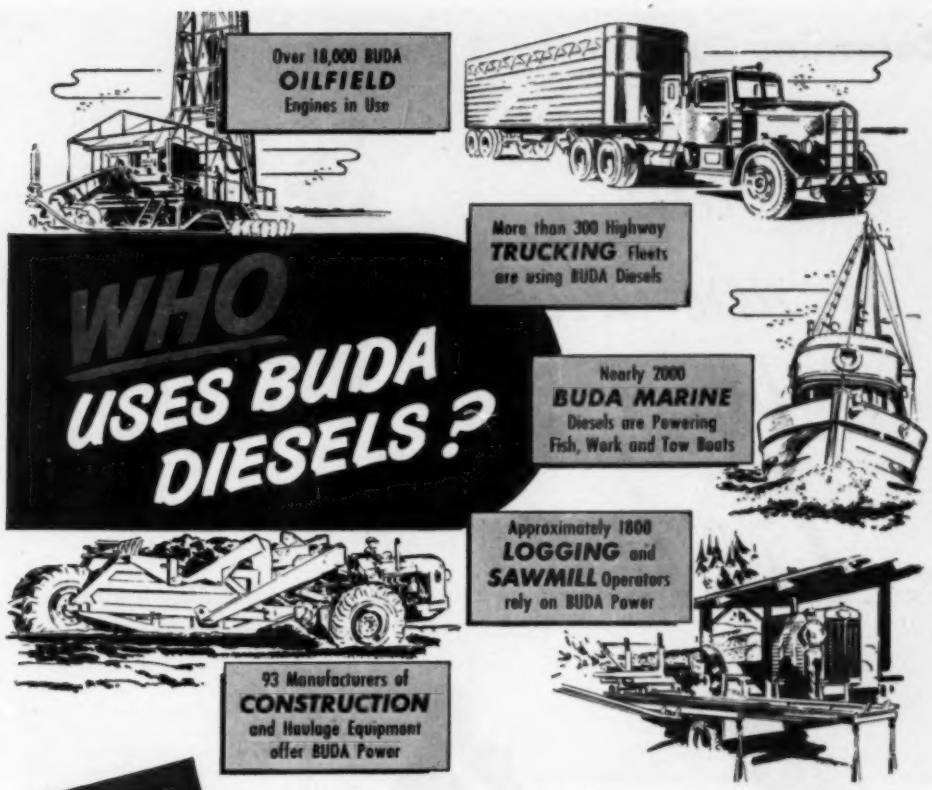
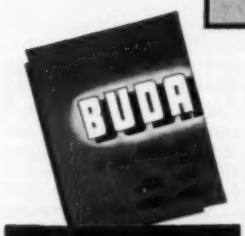
DELCO-REMY • WHEREVER WHEELS TURN OR PROPELLERS SPIN





Get this New Bulletin on BUDA DIESELS today!

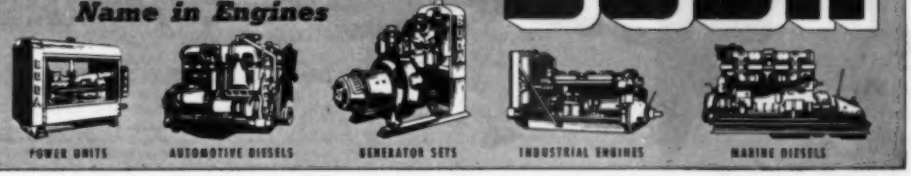
The wide acceptance of Buda Diesels in every industry where dependable power is a vital requirement means just one thing . . . If you have an application for power and want maximum performance at lowest all around cost, it will pay you to investigate the definite advantages of Buda Diesels.

Any of the hundred-odd Buda Dealers or Service Stations located from coast to coast can give you complete details. Write for the new general catalog on Buda Diesels. The Buda Company, Harvey, Illinois.

BG-1

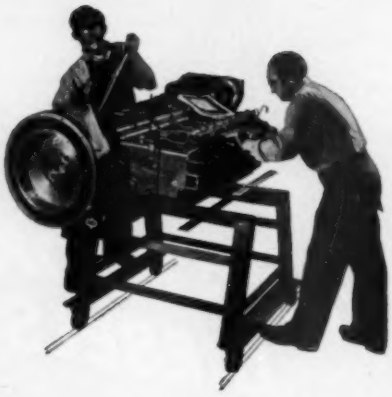
A Power-Full and Dependable Name in Engines

BUDA

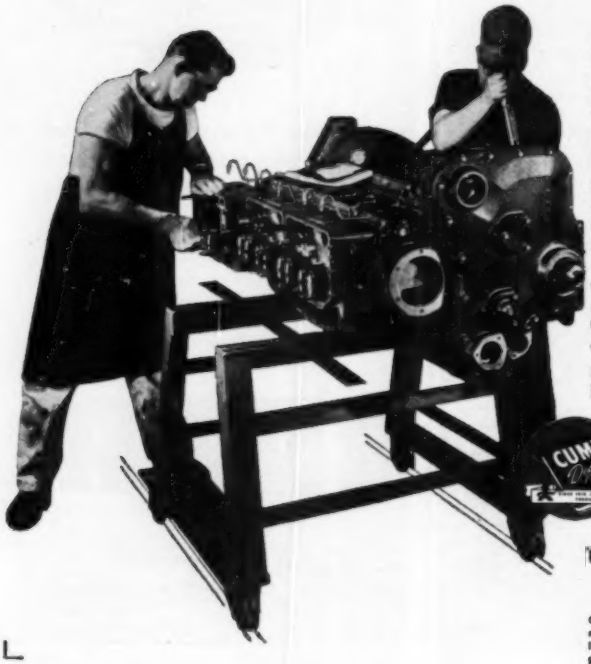


Cummins® Custom-built Diesels

Built not once but Twice



Extra care in building means extra profits for power users



Typical of the extra care that goes into the building of *every* rugged, dependable Diesel is the tear-down of the engine after assembly. First the engine is run in on the test block. Then it is completely torn down and carefully re-inspected. After that it is re-assembled and tested *again*.

Such *extra* care in precision craftsmanship is one of the reasons why Cummins engines have such an outstanding record in a wide range of applications. Cummins exclusive fuel system ... world-wide service and parts supply organization ... are other features that enable power users to make more profit with Cummins Diesels.

There's a model engineered to fit your power needs. Contact your Cummins dealer. He has more facts to show you.

CUMMINS Diesel

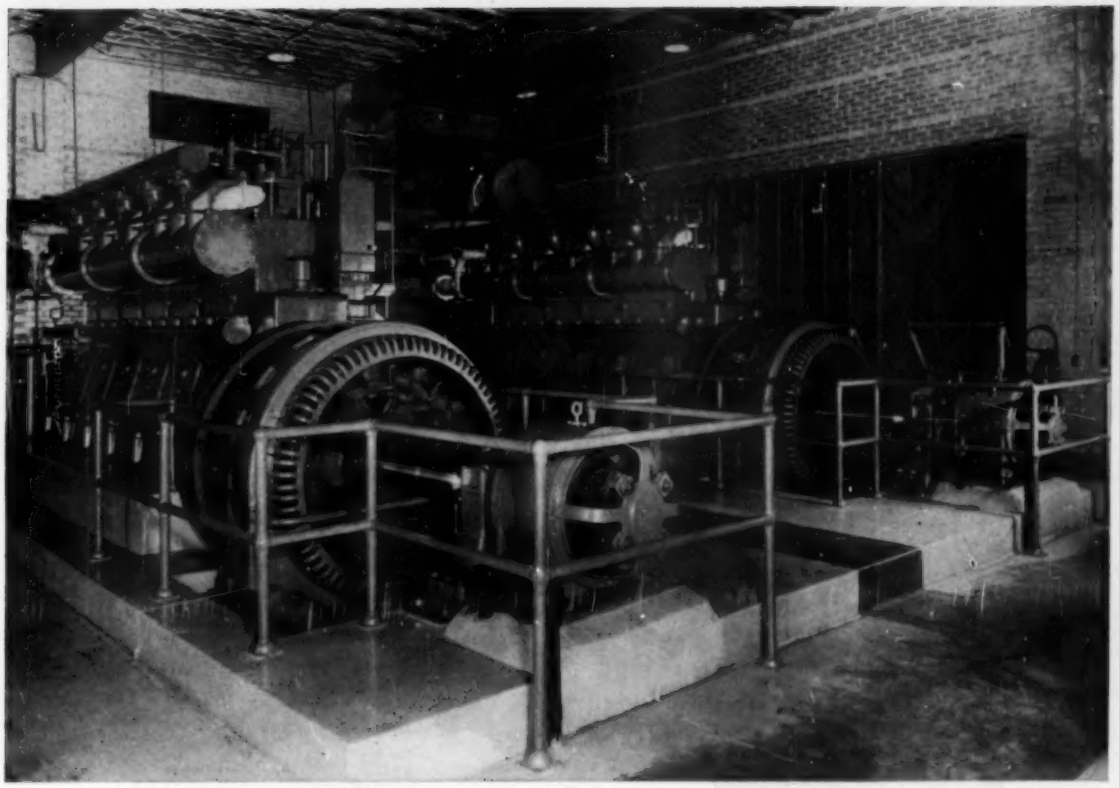
Diesel power by CUMMINS

TRADEMARK REG. U. S. PAT. OFF.

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, IND.

EXPORT: CUMMINS DIESEL EXPORT CORPORATION
Columbus, Indiana, U. S. A. • Cable: Cumdiex

Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks • off-highway trucks • buses • tractors • earth-movers • shovels • cranes • industrial locomotives • air compressors logging yarders and loaders • drilling rigs • centrifugal pumps generator sets and power units • work boats and pleasure craft.



Puts the finger on ring troubles . . .

● Operators of a midwest rural power station found themselves running into serious maintenance troubles. In their two Worthington Diesel engines, rings were sticking and blow-by was fouling crankcases. They decided to discuss the problem with a Standard Oil lubrication specialist.

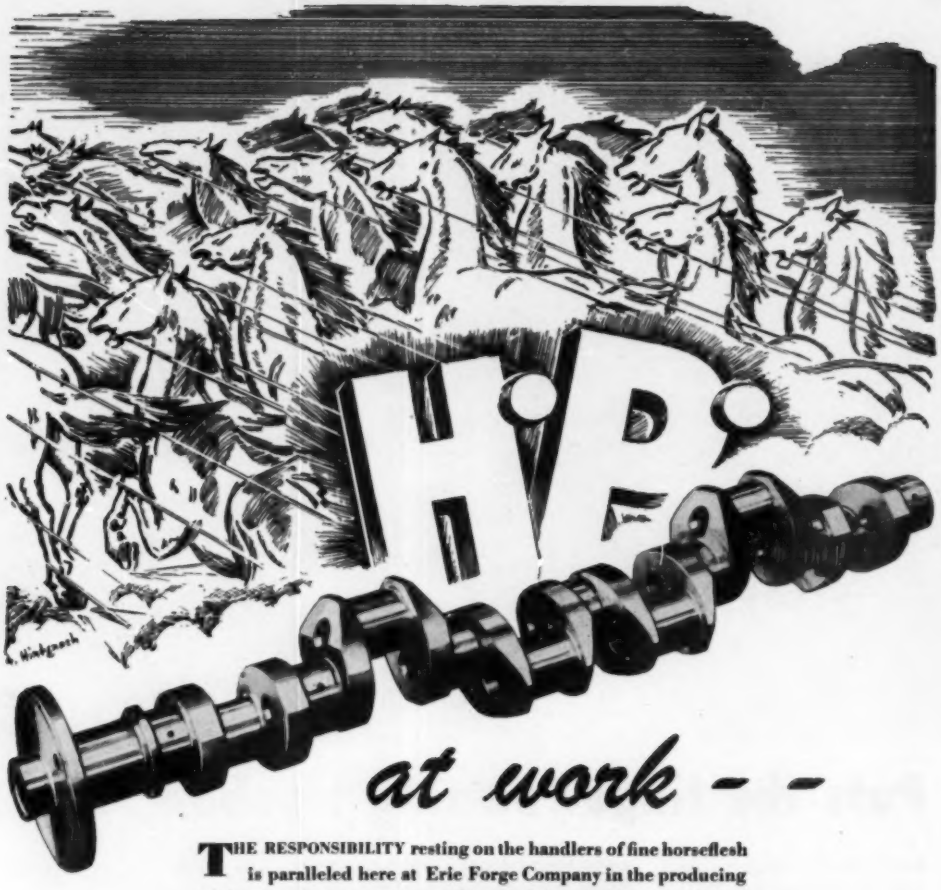
STANDARD HD
Diesel Oil

He advised them to switch the units from the conventional lubricant being used to STANDARD HD Diesel Oil. Tougher operating conditions, he explained, called for the use of a lubricant having high oxidation resistance and excellent detergent qualities.

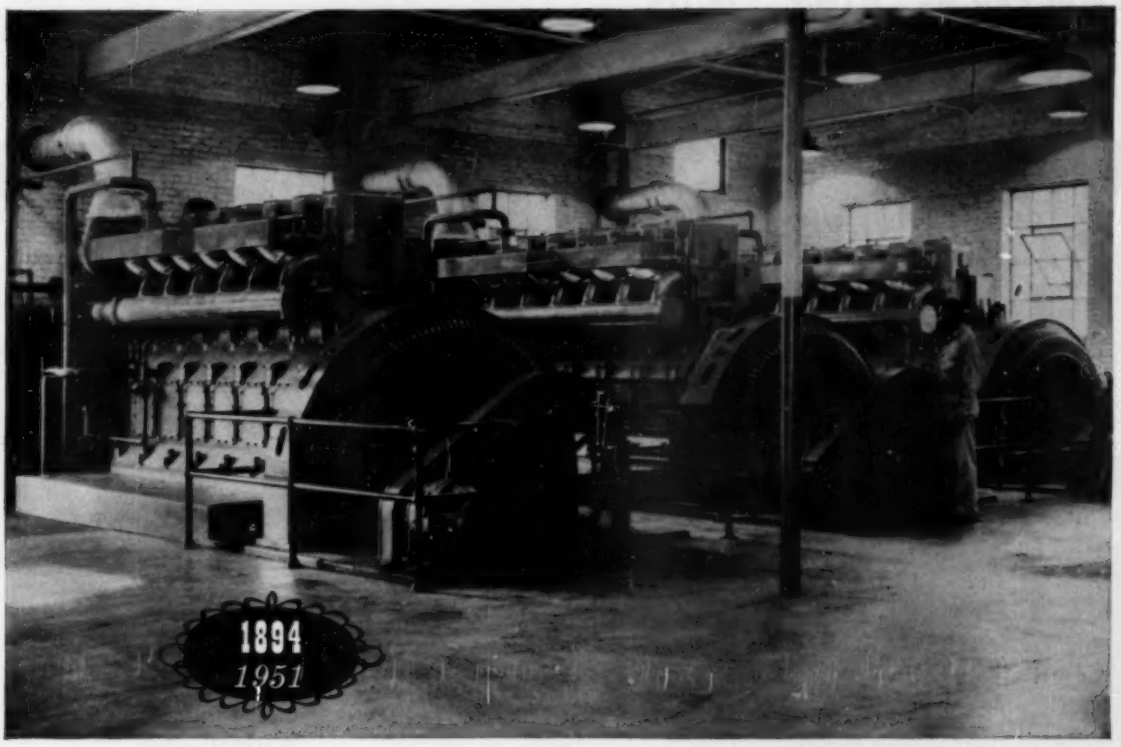
The first sign of better lubrication with STANDARD HD came with the disappearance of crankcase breather smoke, previously caused by stuck rings and blow-by. When inspections were made, they showed rings free, ring grooves and crankcases clean. At the end of a year, operators reported: *maintenance problem solved, fuel economy improved, lubricant consumption reduced.*

You'll find that the benefits of STANDARD HD Diesel Oil and the service of a Standard Oil lubrication specialist will add up to real savings for you. A Standard specialist has the experience and training to help you gain maximum benefits from Standard's fuels and lubricants. This man is located near your plant and will give you "on-the-spot" service. Arrange today, for his visit by contacting the nearest Standard Oil office or by writing to: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD



THE RESPONSIBILITY resting on the handlers of fine horseflesh is paralleled here at Erie Forge Company in the producing of fine cranks, connecting rods and drive shafting for putting Diesel Power to work. Design, Engineering, Metallurgical Control . . . Craftsmanship from raw material-working to precision machine-finishing . . . "Know How" gained by years of intelligent, watchful work . . . These are the One Responsibility and One Control you buy when your specifications become finished products at Erie Forge. Submit your specifications . . . we shall consult with you promptly and with experienced eyes . . . . Together we can create a finer product for you.



Newton, Illinois celebrates 57 years of power progress with ALL-NORDBERG DIESEL PLANT

EARLY vintage carbon arc lights illuminated the streets of Newton, Illinois, for the first time in 1894, powered by the municipally owned plant which consisted of a single boiler and a small steam engine belted to an Edison bi-polar DC generator . . . and was operated only during periods of no moonlight, and from darkness to midnight.

Normal changes and additions were made in the ensuing years, until steam power was abandoned in February of 1950 in favor of more economical Nordberg Diesel power. The first of three 800 HP units was installed in January, 1950, just five months after being ordered, with the other two units following shortly after. All three Diesels are supercharged 4-cycle 6-cylinder units of 13" bore and 16½" stroke, direct-connected to 560 KW generators.

A comparison of generating costs at Newton show a decided advantage in favor of Diesel. While complete steam records are unavailable, the cost per KW hour averaged around 3½c during the last few years. For two months, the cost for Diesel power has averaged about one cent per KW hour, including fuel and lube oil, labor and maintenance. Projected figures indicate a future annual profit of over $70,000 with the Diesel plant.

This is one more typical example of the profit-making ability of Nordberg Diesels. Write for details on units, in sizes from 10 to 9600 HP, to meet *your* requirements.

NORDBERG MFG. CO., Milwaukee 7, Wis.

P151

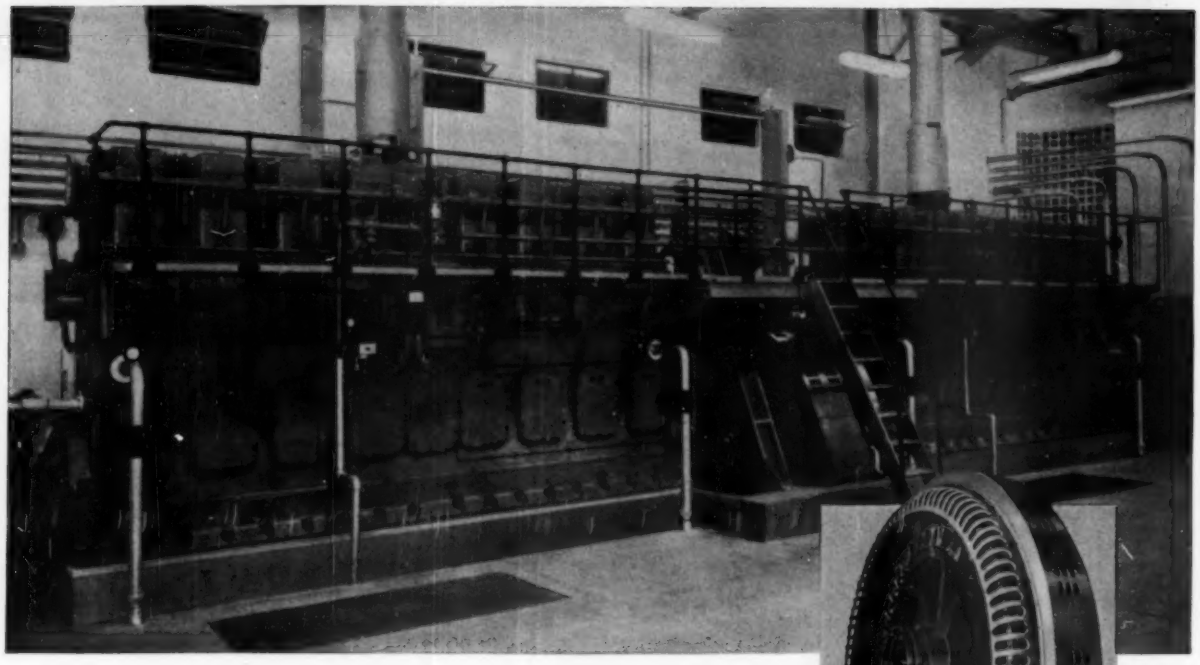
BUSCH-SULZER

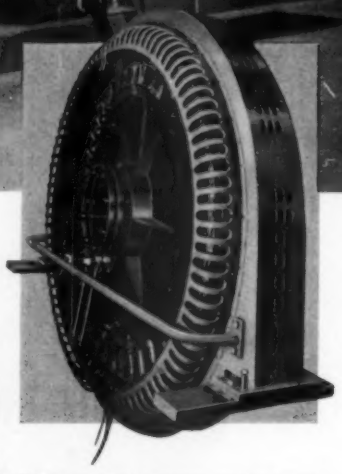
NORDBERG

DIESEL ENGINES

YOU CAN BE SURE.. IF IT'S

Westinghouse





What you can't see...the PLUS added by Westinghouse Engineering

The only job of those big twin diesels, pictured above, is driving the Westinghouse A-C Generator almost lost in between them. An unusual installation—the first of its kind. Like many firsts, it too, presented problems. Insulating against the flow of shaft currents was one of them. Coupling the shaft looked like the answer—*if* an insulated coupling could stand up to the terrific driving force of the twins . . . *if* it lost no torque . . . *if* it could take it for at least a year without maintenance.

The engine builders asked Westinghouse, suppliers of the generator, to tackle the problem.

Westinghouse engineers designed an insulated coupling that did the job—and more, paving the way for future installations of this type.

This example shows the problem-solving ability offered by Westinghouse in building special generators for unusual applications.

Make certain you get the benefit of Westinghouse engineering on your next equipment. Power Apparatus Specialists—in principal cities—will help you select and apply the right equipment to the job. Consult them for any present or future plans. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21571

Westinghouse

DIESEL ENGINE DRIVEN AC GENERATORS

How to keep 3200 horses from breathing dust

TO PROLONG ENGINE LIFE and reduce maintenance, Baldwin-Westinghouse equipped this 3200 hp. diesel-electric locomotive with Air-Maze filter panels. The heavy-duty P-5RR Air-Maze filters prevent dust and soot from entering cabs and engine intakes, yet offer low resistance to high velocity air.

The all-metal construction and special design of the P-5RR panel permits quick, thorough cleaning so that replacements are unnecessary. It's one of the many Air-Maze air and liquid filters used by leading Diesel manufacturers to make their products last longer, work better, require less attention.

Engineered air and oil filtration by Air-Maze gives your equipment complete protection against unnecessary wear resulting from dirt and grit. It's the cheapest performance insurance you can buy. When buying diesels, look for the Air-Maze filters. When buying filters, call in Air-Maze, the filter engineers. Air-Maze Corporation, Cleveland 5, Ohio.

P-5RR Air-Maze panel filters like this one are used on the Baldwin-Westinghouse diesel-electric locomotive shown above to remove damaging dust and dirt from the air.

The biggest names in diesels are protected by Air-Maze filters

AIR FILTERS
SILENCERS
SPARK ARRESTERS

AIR-MAZE
THE FILTER ENGINEERS

LIQUID FILTERS
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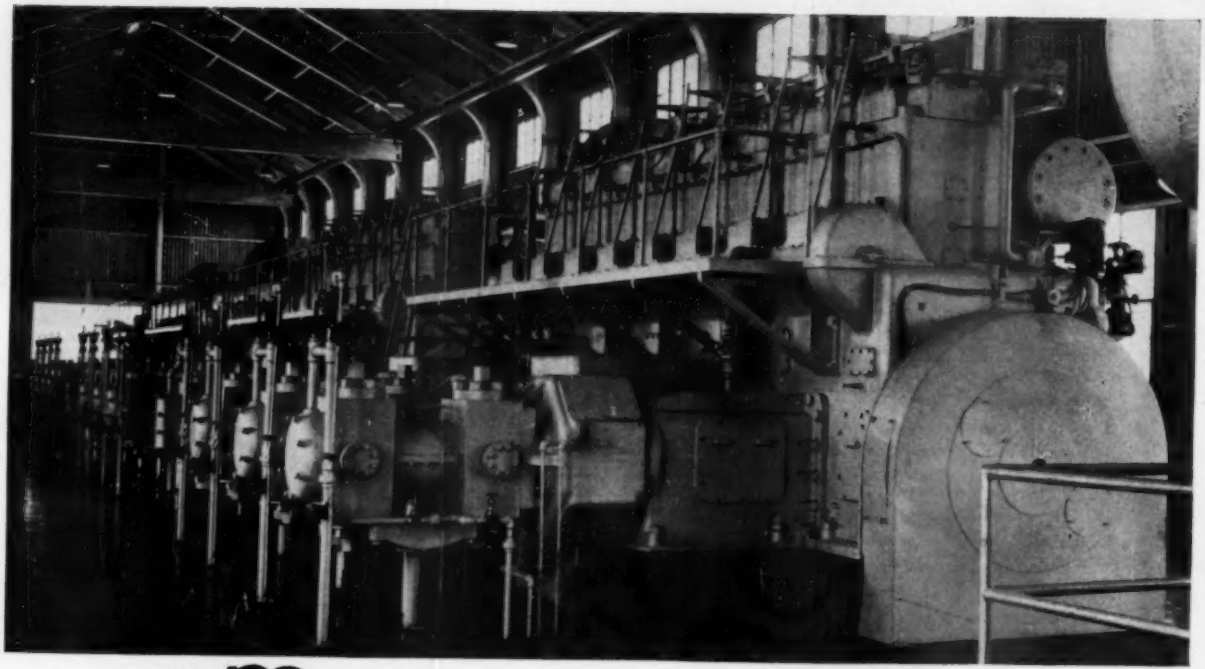
GREASE FILTERS

Typical Installation of Clark Bros. Co. 1600 H.P. Gas Engine Compressor Units

equipped with Marquette

Hydraulic Speed Regulating Governors



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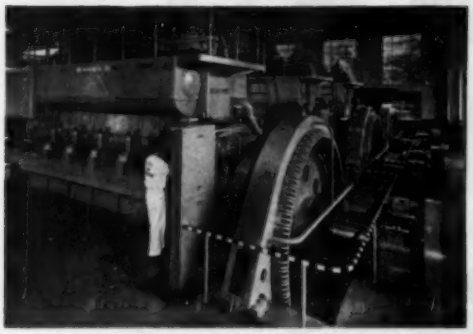
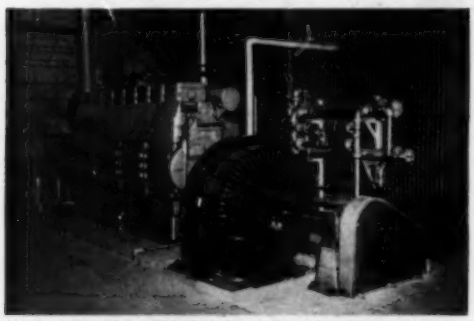
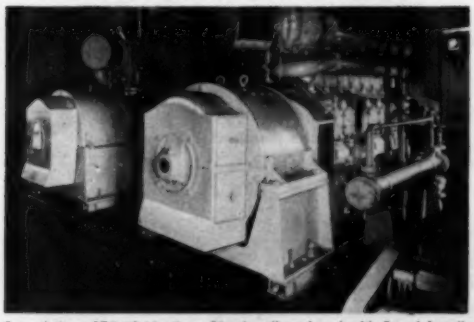
Savings CREATED BY NORDBERG DIESELS RELY ON DEPENDABLE HEAT EXCHANGERS *to a large measure!*



Three 2000 HP Nordberg Diesels, all equipped with Ross lube oil and jacket water coolers, in Houma, Louisiana municipal power plant.



Nordberg 720 HP (at 720 RPM) Diesel, Ross lube oil and jacket water cooler equipped, serving as standby unit for emergency power requirements of Owens-Corning Fiberglas Corp., Santa Clara, Calif.



Two of three 375 HP Nordberg Diesels, all equipped with Ross lube oil and jacket water coolers, generating power for all machinery in U. S. Engineers Mattress Laying Plant along Mississippi River. (Installation on mooring barge).

In industry, municipal power plants or aboard ship, Nordberg Diesel Engines achieve substantial savings in fuel, lube oil, labor and maintenance. "They provide the most economical answer to modern power needs," says Nordberg Mfg. Co. of Milwaukee, Wisconsin.

. . . and in meeting today's demands for adequate power at low cost, Nordberg must place as much importance on the selection of components as it does on its own engineering, design and construction. For clearly, so vital a component as a heat exchanger could well cancel out much of the efficiency of an engine, were its own performance deficient. *Dependable heat exchanger performance is relied on,* TO A LARGE MEASURE!

Therefore, throughout its wide range of two and four-cycle engines, in sizes from 10 to 9600 HP, Nordberg makes extensive use of Ross Exchangers . . . knowing full well that Ross Exchangers as built-in components assure constantly safe and effective temperatures for both lube oil and jacket water . . . and knowing, too, as other leading Diesel builders know, that the Ross reputation for dependability matches its own.

★ *HELPFUL DESIGN DATA* For Diesel builder or user, large or small HP ratings, the information in Ross literature will prove of extreme usefulness. Write.

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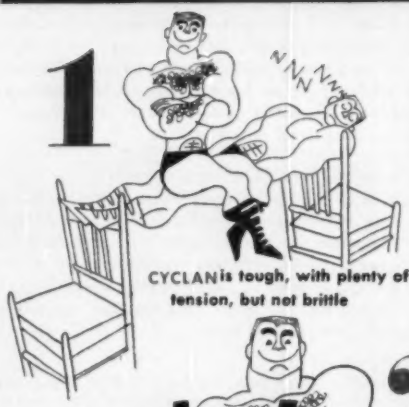
The new Piston Ring material for tough service in heavy duty Diesel and Gas Engines



1 CYCLAN is tough, with plenty of tension, but not brittle

4 CYCLAN withstands impact, hammering, flexing

2 CYCLAN has twice the breakage resistance of ordinary iron

5 CYCLAN withstands considerable distortion without losing shape

3 CYCLAN will not change structurally under heat

6 CYCLAN resists wear far better than standard ring iron

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De Laval Oil Purifiers provide the same thorough protection for diesel engines aboard smaller craft as they do on large vessels. By means of centrifugal force, they keep the lubricating oil free of both enemies of proper lubricating oil performance—water and dirt—and thus insure against engine trouble.

By keeping the oil constantly clean and dry, danger of water forming an emulsion is eliminated. Only clean, pure oil goes back to bearing surfaces.

Dirt is promptly removed by De Laval centrifugal machines. A De Laval Oil Purifier, on continuous by-pass, purifies the oil in circulation three or four times—assuring better engine performance and removing danger of clogged oil lines.

Fuel oil, too, by being centrifuged can be made to deliver every available B.T.U. without loss due to solid or liquid impurities. Moreover, purification of fuel oil saves wear on injection nozzles.

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THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

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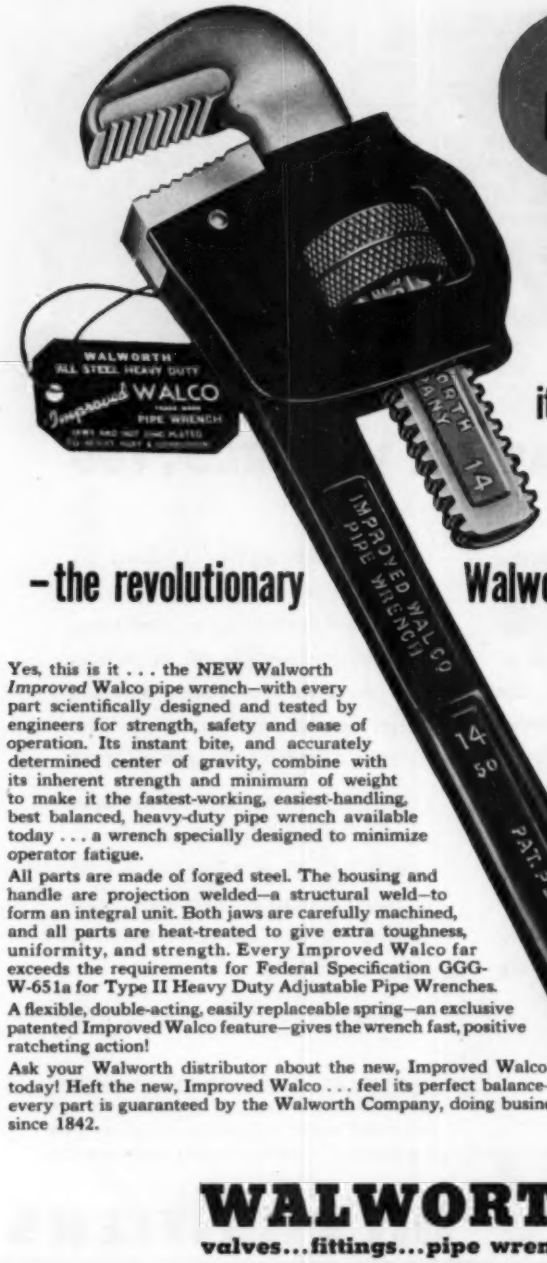
FOR LUBRICATING AND FUEL OIL



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it's the strongest pipe wrench in the world!

–the revolutionary Walworth improved Walco®

Yes, this is it . . . the NEW Walworth *Improved* Walco pipe wrench—with every part scientifically designed and tested by engineers for strength, safety and ease of operation. Its instant bite, and accurately determined center of gravity, combine with its inherent strength and minimum of weight to make it the fastest-working, easiest-handling, best balanced, heavy-duty pipe wrench available today . . . a wrench specially designed to minimize operator fatigue.

All parts are made of forged steel. The housing and handle are projection welded—a structural weld—to form an integral unit. Both jaws are carefully machined, and all parts are heat-treated to give extra toughness, uniformity, and strength. Every Improved Walco far exceeds the requirements for Federal Specification GGG-W-651a for Type II Heavy Duty Adjustable Pipe Wrenches.

A flexible, double-acting, easily replaceable spring—an exclusive patented Improved Walco feature—gives the wrench fast, positive ratcheting action!

Ask your Walworth distributor about the new, Improved Walco today! Heft the new, Improved Walco . . . feel its perfect balance—every part is guaranteed by the Walworth Company, doing business since 1842.

Check these outstanding features

LIGHTER: Housing and Handle are projection welded to form one integral unit.

CORRECT BALANCE: Accurate, the correct location of the center of gravity determined by test.

STRONGER: Heat treated to eliminate brittleness . . . cracking.

FAST ACTING: Scientifically designed spring action insures positive ratcheting action . . . quick bite.

CALIBRATED PIPE SCALE: Built-in scale permits speedy adjustment to pipe size.

RENEWABLE PARTS: All parts are readily obtainable, and easily replaced without special tools; thus prolonging service life indefinitely.

RUST RESISTANT FINISH: Entire wrench is rust resistant—Nut and Jaws have a special electroplated zinc coating.

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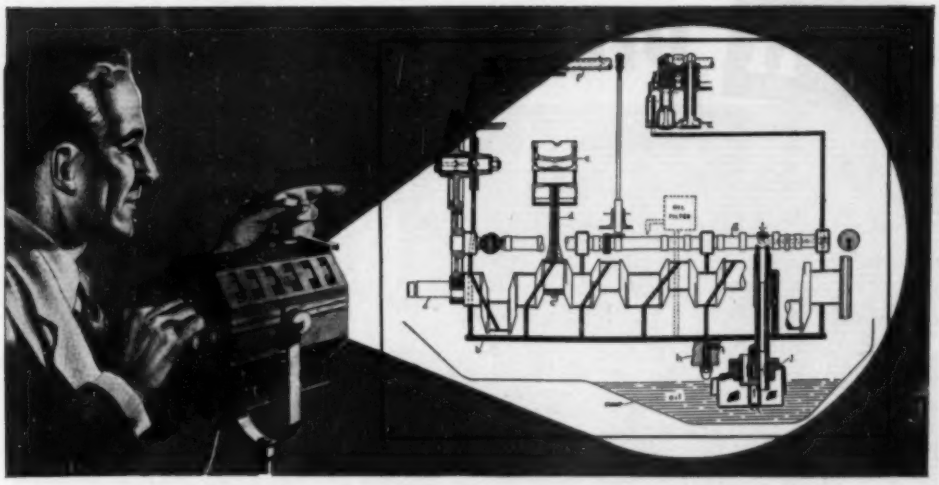

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EVEN THE NORMAL EFFECTS from compression, combustion and load make it tough enough for any Diesel engine oil. Yet in addition you want to be sure your Diesel oil will be master of special needs —sometimes imposed by particular mechanical conditions . . . or by fuel characteristics, load or even by factors of climate and altitude.

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The Cities Service complete line of top quality petroleum products includes a Diesel lubricant for every operating condition.

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MEAN FEWER TROUBLES FOR YOU

You'll like the way so many parts have been designed *out* of P&H Diesels. It makes them simpler, more dependable for all types of service. It makes them easier to understand, easier to service. It lets you cut parts inventory — and costs, too! It's another important reason why experienced users are switching to P&H Diesels . . . *standardizing on them.* Five models: 1, 2, 3, 4, and 6-cyl. For literature, write P&H Diesel Division, Harnischfeger Corporation, Port Washington, Wisconsin.

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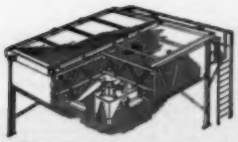
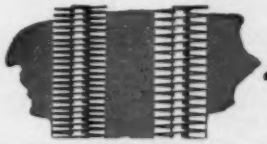
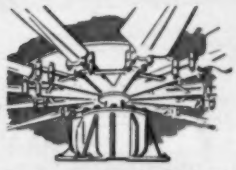


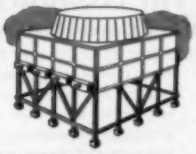
RIGID STRUCTURE . . . truss-sections give rigid but light design — requiring a small, inexpensive foundation. Rigidity assures longer-life coil sections.



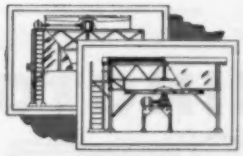
EFFICIENT FINNED TUBES . . . pressure bonded fins on tubes give high level heat transfer not dependent on solder joints. Various fins, tubes and headers available to meet any application.



PROVEN MECHANICAL EQUIPMENT . . . multibladed fans and rugged Geareducers team up to give quiet, smooth and dependable operation . . . regardless of weather or location.

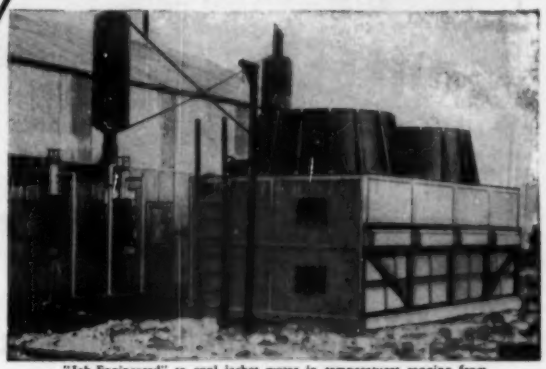


ALTERNATE MATERIALS . . . where corrosion is a problem, asbestos-board casing on a redwood frame requires little maintenance. Redwood, standard in cooling tower design, gives strong, durable and rigid support.



COMPLETE STANDARD LINE . . . induced draft or forced draft — portable or stationary — steel or redwood — various fin and tube materials and arrangements are offered by Marley to meet any application — usual or unusual.

Features like these . . . make MARLEY DriCooler® "JOB-ENGINEERED"



"Job-Engineered" to cool jacket water in temperatures ranging from −40F to 100F, an induced draft, asbestos-covered redwood structure.

No single design in an air-cooled heat exchanger will suit all applications. Cooling jacket water in below-zero temperatures, condensing gasoline on the sea coast or serving a pipeline compressor station in the desert . . . each is an exacting application . . . each requires a different type of unit. And that's why Marley has a complete line of DriCoolers available in all sizes and in a wide range of designs and materials.

After considering all factors, such as the fluids to be cooled — first cost — horsepower cost — weather conditions — corrosion and many other factors, Marley can make the best and most economical recommendation for your job.

Whether your job requires forced draft or induced draft design, steel or asbestos-board covered redwood structures, special fin or tube materials, you can be sure that your Marley DriCooler is "Job-Engineered" for your specific application.

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. . . on the Bonneville Salt Flats . . . it's

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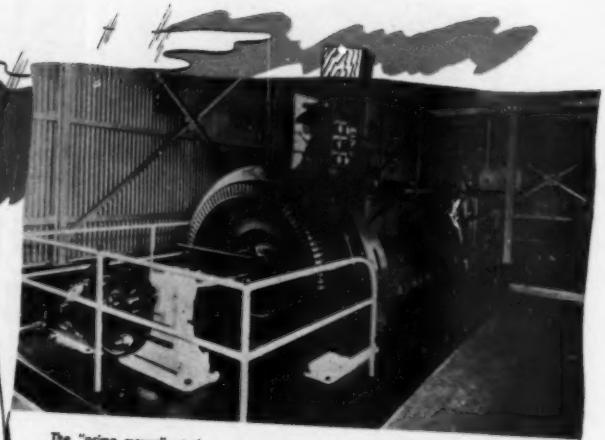

The "prime mover" at the modern plant of Bonneville, Ltd., Wendover, Utah. A Worthington Supercharged Diesel Engine, Type SCC-6. Worthington auxiliaries are used for the water cooling system.

Worthington Engine Outstanding For Economy and Dependability Under Difficult Conditions

Organized in 1935, Bonneville, Ltd., is a primary source of commercial potash, producing 70,000 tons annually from the evaporating ponds in the Wendover, Utah, Salt Flats area. This remote site of the world's automobile speed records is far from public utility plants, even from adequate fresh water supply. Power, therefore, is a problem.

Management found the solution in a Worthington Supercharged Diesel, Type SCC-6, rated 489 hp at 4,250 ft elevation.

Replacing several small, high speed Diesels, the new Worthington unit is the sole electrical generating source in a set-up designed by Worthington engineers to deliver maximum power from the fuel consumed, and to operate with a cooling system requiring a minimum of make-up water.

For The Record

The Bonneville Worthington has lived up to every expectation for efficient, cost-cutting performance. *Consumption of fuel oil is at the rate of 14.25 kw hours per gallon at this altitude. Also, over 75% of the low-cost fuel oil is put to useful work — utilization of heat from the exhaust and from the cooling system (high-temperature type) being a main factor in achieving this high percentage.*

To a broad range of ratings including every type of heavy duty Diesel and gas engine, Worthington adds outstanding engineering knowledge and a rich background of experience — and technical assistance to help you get the most out of your own power planning. For further details of the dependable, economical Diesel performance that proves *there's more worth in Worthington*, contact *Worthington Pump and Machinery Corporation, Engine Division, Buffalo, New York.*

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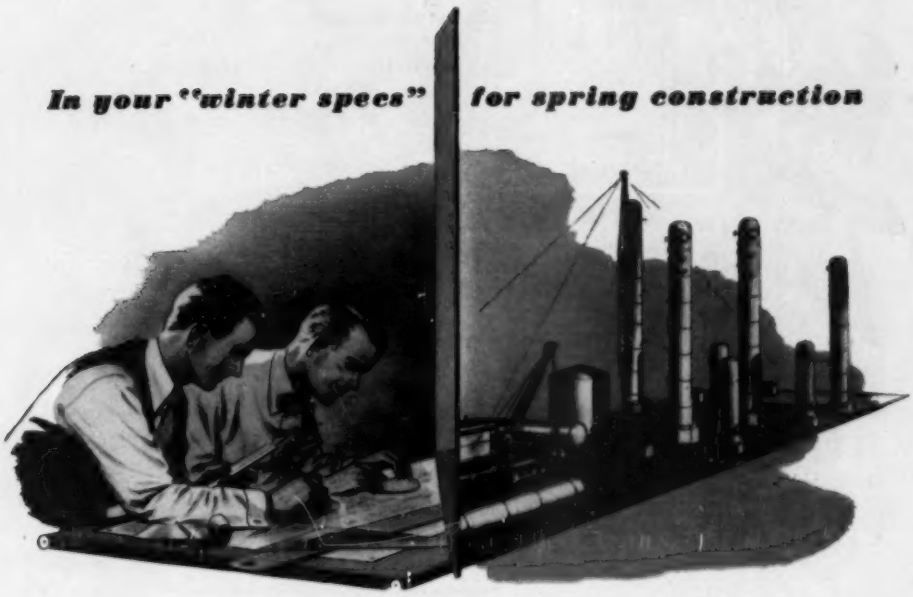
In your "winter specs" for spring construction



It will pay you to consider these four advantages of a Fluor Pulsation Dampening Piping System . . .

1 **Pressure drop calculation based on smoother flow**

2 **Improved gas metering accuracy**

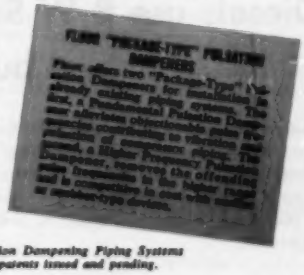
3 **Virtual elimination of piping maintenance**

4 **Consideration of safety records**

The Fluor Pulsation Dampening Piping System is the newest and most practical approach to "pulse-free" piping yet developed. Designed primarily for installation in new construction utilizing piping to handle air, steam, or hydrocarbons at operating pressures ranging from a vacuum to 5,000 psi at any temperature, this Fluor-designed piping system removes objectionable pulse peak pressures caused by the reciprocating action of compressors.

Fluor Pulsation Dampening Piping Systems are *guaranteed* to provide a virtually smooth gas flow with minimum pressure drop. Safety is increased by eliminating vibrational stress on piping, heat exchangers and vessels. Compressor operating efficiency is increased, metering inaccuracies caused by pulsative flow are reduced, and maintenance problems common to conventional piping systems are cut to a minimum.

If you are in the process of drawing up specifications for current or contemplated construction involving compressor piping, it will pay you to write for Fluor Bulletin No. PDS-8501. Or, contact your nearest Fluor Representative for attention to your particular problem.



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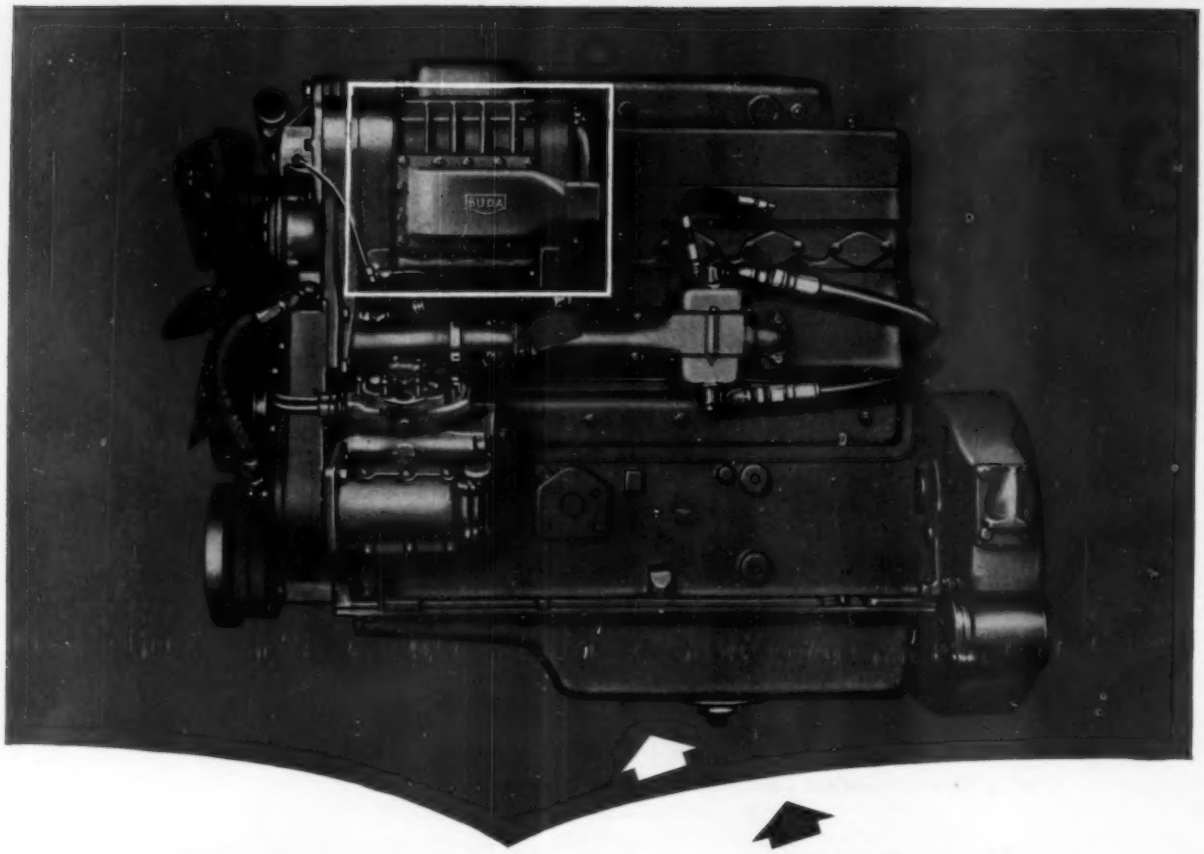

BUILT-IN POWER

BUDA Diesels use B-W Superchargers built in for added horsepower and economy

The Buda Company of Harvey, Illinois, uses B-W Superchargers on their diesels. This recently released automotive diesel engine, Model 6-DTS-468, develops 150 brake horsepower at 2,400 r.p.m. Designed for heavy-duty truck operation both at sea level and altitude. The supercharger on this engine is one of a standard line developed by Pesco Products Division.

For motor truck, marine, railway or general industrial applications, supercharging means savings in engine space and weight . . . means power to pull heavy loads . . . means sea level operation at high altitudes. All these extra benefits without corresponding increases in operating costs.

The engine manufacturer who wants to pack more power into a given engine size . . . or who wants to add an entire new series of models to his line without retooling or the expense of redesign, can do so simply by equipping his present line with B-W Superchargers. One of our engineers will gladly explain how this can be done. There is no obligation. Write today to:

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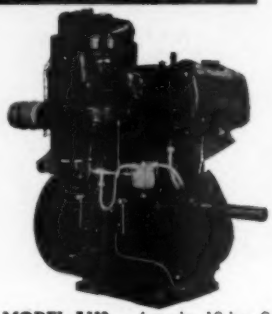
Petter water-cooled diesel engines are available in two basic 4-cycle models. Series AV–3 to 12 hp. Series B–12 to 36 hp. Thermo-syphon tank cooling or radiator. Hand or electric starting without difficulty, even under sub-zero conditions. Full-speed drive from either end or half-speed drive from timing-gear end except on B3 and B4 models. Aluminum alloy pistons and removable cast iron liners.

Type	HP Cont.	RPM	BORE In.	STROKE In.	LENGTH In.	WIDTH In.	HEIGHT In.	WEIGHT Lbs.
AV1	3/6	1000-1800	3.15	4.33	29.75	17.75	28.5	406
AV2	6/12	1000-1800	3.15	4.33	36.5	17.75	28.5	598
B2	12/18	1000-1200	4.33	4.33	43.5	21	37	939
B3	18/27	1000-1500	4.33	4.33	50.125	21	37	1218
B4	24/36	1000-1500	4.33	4.33	56.75	21	37	1478

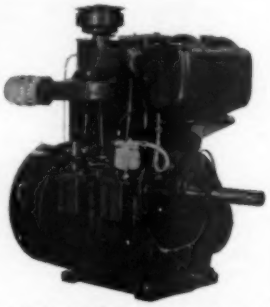


MODEL AV2 — 4-cycle, 12 hp, 2-cylinder, 1800 rpm, vertical, water-cooled industrial diesel engine.

PETTER *Air-Cooled* DIESELS

TYPE AVA–3 to 11 hp in 1 and 2-cylinder models. Air-cooled by flywheel fan and ducting over finned cylinders and cylinder heads. Light weight, low overall dimensions. Hand or electric starting. Full-speed drive from either end, or half-speed drive from timing-gear end. Totally enclosed, but easily accessible. Dependable operation under any climatic conditions. Direct injection with an open combustion chamber insures easy starting.

Type	HP Cont.	RPM	BORE In.	STROKE In.	LENGTH In.	WIDTH In.	HEIGHT In.	WEIGHT Lbs.
AVA1	3/5.5	1000-1800	3.15	4.33	29.75	20	29	390
AVA2	6/11	1000-1800	3.15	4.33	37.75	21	32	558



MODEL AVA2—4-cycle, 11 hp, 2-cylinder, 1800 rpm, vertical air-cooled industrial diesel engine.

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FRONT COVER ILLUSTRATION

A diesel dragline loading a diesel tractor for export shipment at Port of Oakland, California.

Cutaway view of a 6-cylinder supercharged locomotive Diesel engine, rated 500 hp at 1000 rpm.

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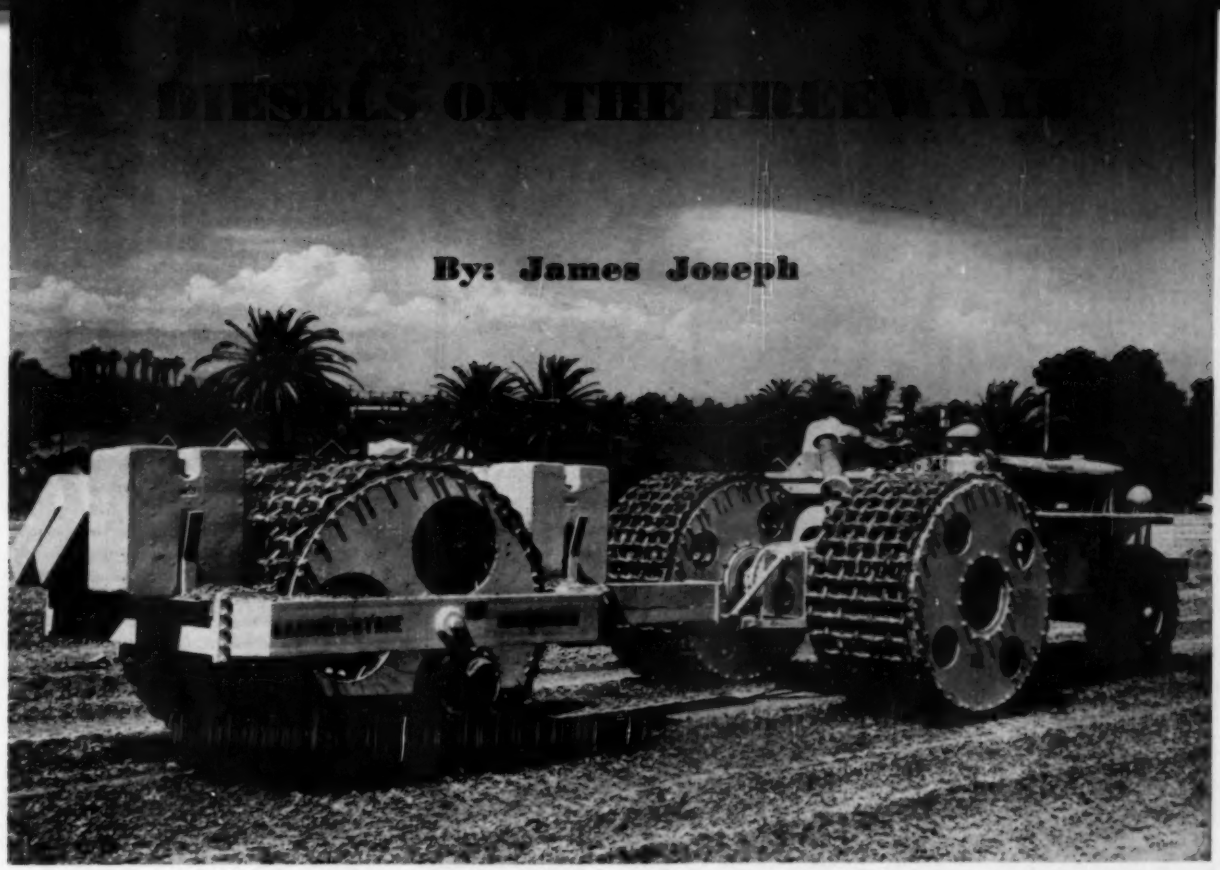
FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

DIESELS ON THE FREEWAYS

By: James Joseph



Gardner-Byrne grid compactors working the freeways, pulled by a Caterpillar diesel.

DIESELS are rooting up concrete foundations, dozing over old streets – laying the foundation for the great Los Angeles freeway system which someday will bisect and criss-cross metropolitan Los Angeles in a maze of super-speed highways – 613 miles of them in all. It's a project where diesel equipment performs right before the public –before audiences of thousands of sidewalk superintendents stationed at every underpass, bridge, and along miles of construction right of ways. And diesels are putting on quite a show.

The show began back in 1939-40, when the first freeway construction began. It was a modest beginning, laying a 1.6 mile strip of freeway over Cahuenga Pass–from Hollywood into the now-fast growing San Fernando valley. Just when the final curtain will be drawn is any body's guess. At the rate of current construction, most of us won't be around to see the last mile laid. To date, about $82,000,000 have been thrown into the project–which, construction-wise, is a mere scratching of the surface, considering that overall costs will run close to $4,000,000 a mile by latest estimates. And that means that about two and a half billion will be spent for the entire 613-mile project. The rate of current building is about 5 miles per year. All-in-all, is appears that diesels will be around for long while on the project.

All of which makes the Los Angeles freeway system one of the most prolonged diesel shows on earth. Thus far, only about 20 miles of freeways have been built since 1939. By 1953, eleven of the 16.5 miles of the Hollywood freeway from the San Fernando valley into downtown Los Angeles are expected to be opened. The Los Angeles freeway system, although some 20 years in the planning, didn't get started until 1937 – which is a significant year both for diesels and for state highway construction. That's the year that the California legislature passed a bill allowing freeway construction costs to come out of gas tax receipts. From a long-range point of view, it meant that California law makers at last had recognized super-speed, metropolitan highways as part of the over-all road construction scheme. Although the legislature hadn't planned it that way, it also gave diesels, the work-horses on any big construction job, a long-term future and an important roll in modernizing Los Angeles' already congested traffic set-up.

Four main east-west-south-north freeways, with their junction at a four-level structure near downtown Los Angeles are now abuilding. There's the Hollywood freeway, the Arroyo Seco (almost completed because of earlier construction), Harbor and Santa Ana freeways. Shorter super-speed highways, the Romona and Sepulveda freeways, are likewise under construction. of the 613 total miles of freeways now on the drawing boards, about 176 miles will be in metropolitan Los Angeles, with the remainder feeding in from outlying areas – from the harbor, east Los Angeles County, and from cities south of Los Angeles. The cost at times has been staggering – always the case when right-of-ways must be purchased through established business districts. For a single mile of right-of-way through downtown Los Angeles, an estimated $10,000,000 is being spent. That's without any construction–before a single diesel dozer starts pushing old foundations over.

Up-to-the-minute per mile cost estimates put part of the Harbor freeway at $14,000,000 a mile – including right-of-way purchase. Some sections of the Hollywood freeway have already cost $6,500,000 a mile. Santa Ana freeway per-mile costs have reached $4,500,000 in places. How many diesels have been thrown into the freeway project is anybody's guess – but the number is high. Twenty to thirty different contractors are simultaneously working on various phases of the project – each with his own equipment. From the very beginning, diesels have helped make construction history. One of these "headlined" job – was Guy F. Atkinson's leveling of historic Fort Moore hill in downtown Los Angeles to make way for road-building. The hill, containing 835,000 cu. yds. of material, was blasted, dozered, clam-shelled – and carried away bodily.

Innovation has also played a big part. Some embankments were rolled using Caterpillar DW-19 rubber-tired tractor units converted so that the rear wheels consisted of drums from a small sheepsfoot roller. Additional weights were placed over the rear axles, giving a load of 265 psi. on each tamper foot. This roller – constructed on the job – was able to make almost three times as many trips per hour as a tractor-drawn roller.

And the cost of this rig was considerably less than for conventional roller machines. In landscaping, too, diesels are playing their role. All freeway slopes are being pulverized to a depth of 5 inches to provide for future landscaping. One contractor, N. M. Ball Sons, built a scarifier unit that is triangular and has scarifier teeth along the base. Where work can be carried on in the open, the unit is fastened to a truck-mounted dragline, with the apex of the triangle attached to the dragline cable. The unit is hoisted to the top of the slope and dragged down, pulverizing as it goes. But where there's no room to swing the dragline, the scarifier unit is modified so that it is placed at the bottom of a Caterpillar D-8 bulldozer blade. The dozer is run in reverse down the slope so it doesn't leave tracks on the broken and aerated surface.

The freeway construction program, inaugurated in 1939, was bogged down during the war, and didn't get going again until 1946. Since that date, progress, as recorded by a leading construction magazine, has been "a great achievement". Since 1946, 36 separate contracts have been awarded on the Hollywood freeway alone — and have resulted during the past 4½ years in the completion of 31 bridges, with 7 more currently under construction. On a bridge across one section of this freeway, a 35 ft. excavation was made for storm drains, using a Buckeye 228 trencher, a Caterpillar D-7 tractor with bulldozer and numerous other pieces of diesel equipment. The Buckeye did the trenching the D-7, the cleaning and grubbing. In another phase of freeway construction, on the Romona section, a D-7 Caterpillar tractor with a "Hystaway" unit attached, is being used to lift ready-mix concrete into an excavation where piles are being cast. On the same project, a Super C Tournapull, 12 yd. capacity, aided by an Allis-Chalmers HD-18 bulldozer, cut down grades for a temporary road—under contractor J. E. Haddock, Ltd.

Timbered, temporary bridges have been built along many miles of the highway — as by-passes and detours. Typical is a temporary piling to support the concrete forms south of railroad tracks on the Ramona freeway — site of a new reinforced concrete bridge to span the freeway. Timbers were swung into position by a half-swing boom mounted on a Caterpillar TD-14 tractor. Along many more miles of the project, sheepsfoot rollers and other compacting machinery are moving in never-ceasing crescendo towed by diesels. Caterpillar D-8 bulldozers have come in for their share of this work. A Northwest diesel crane, with ¾ yd. clamshell bucket, was used by one contractor to excavate footings for a bridge on the Ramona freeway. Another Northwest crane, 1¾ yd. capacity, was put to work by Oberg Bros. on still another bridge. Major equipment employed by just one of the contractors, J. E. Haddock, Ltd., includes six Caterpillar D-8 tractors, one Allis-Chalmers HD-18 tractor, four Super C Tournapulls, two Caterpillar 12 motor patrols and a Hough loader. Totaled, construction men estimate that anywhere from 200

Overpasses and underpasses on this section of the Ramona freeway — as well as most construction work can be written-up as diesel built.

to 400 pieces of diesel equipment are currently working on various sections of the freeways.

With an eye to increasing government restrictions as the defense program gets underway, freeway planners admit that they were stopped once by war — and that it could happen again. But the plain fact is that freeways — and only freeways — can solve the congested Los Angeles traffic problem, which as one engineer said, "is all but a bottleneck right now." The Hollywood freeway is far nearer completion than most realize. Bridge construction completed and well under way accounts for 71.7% of all structural separations required for the 8½ miles of new roadway scheduled. The 6.7 miles of grading and paving completed and in progress accounts for almost 80% of all new highway for this project.

As one diesel distributor said the other day, "there has never been a project in southern California using so much and so varied an amount of diesel, road-building equipment. I'd say that almost every manufacturer and every type of road gear — dieselized — is out there doing its stuff."

One of the current freeway jobs — and the fourth largest ever assigned to a contractor for freeway work in the Los Angeles metropolitan area is $1,225,489 for work which combines major bridge, subway, storm drain, and sewer construction — in addition to freeway construction. This combination is unusual on the freeway, which to date has been awarding separate contracts for single phases of the project. Here again — diesels came into their own. Two Caterpillar D-8 tractors and bulldozers cleared the right-of-way. Then diesel equipment and crews moved in to excavate three main storm drains with their accompanying laterals, catch basins, manholes, and junction chambers. In this early work, a Northwest dragline and Northwest shovel were used for excavation, a Northwest truck crane laid the pipe. Engineers and state officials are now conjuring up some kind of bonding idea which will assure a still faster construction pace. They point out that the freeways are needed right now — and waiting to complete the project piece-meal, as gasoline tax money comes in at the rate of about $50,000,000 every 10 years, simply means that the population will obsolete the freeways now planned even before they're built. But no matter in what stage the work progresses, diesels are the main actors — and chief contributors — to one of California's and the Nation's biggest freeway programs.

A Caterpillar tractor piles aggregate at one of the numerous batching plants along the freeway . . . just another diesel job.

Diesel road-building equipment in a race with time to open this section of the freeway by January, 1951

Diesels and pavers at work on the freeways.

Diesels and men at work on a section of the Hollywood freeway.

GENESEO ILLINOIS

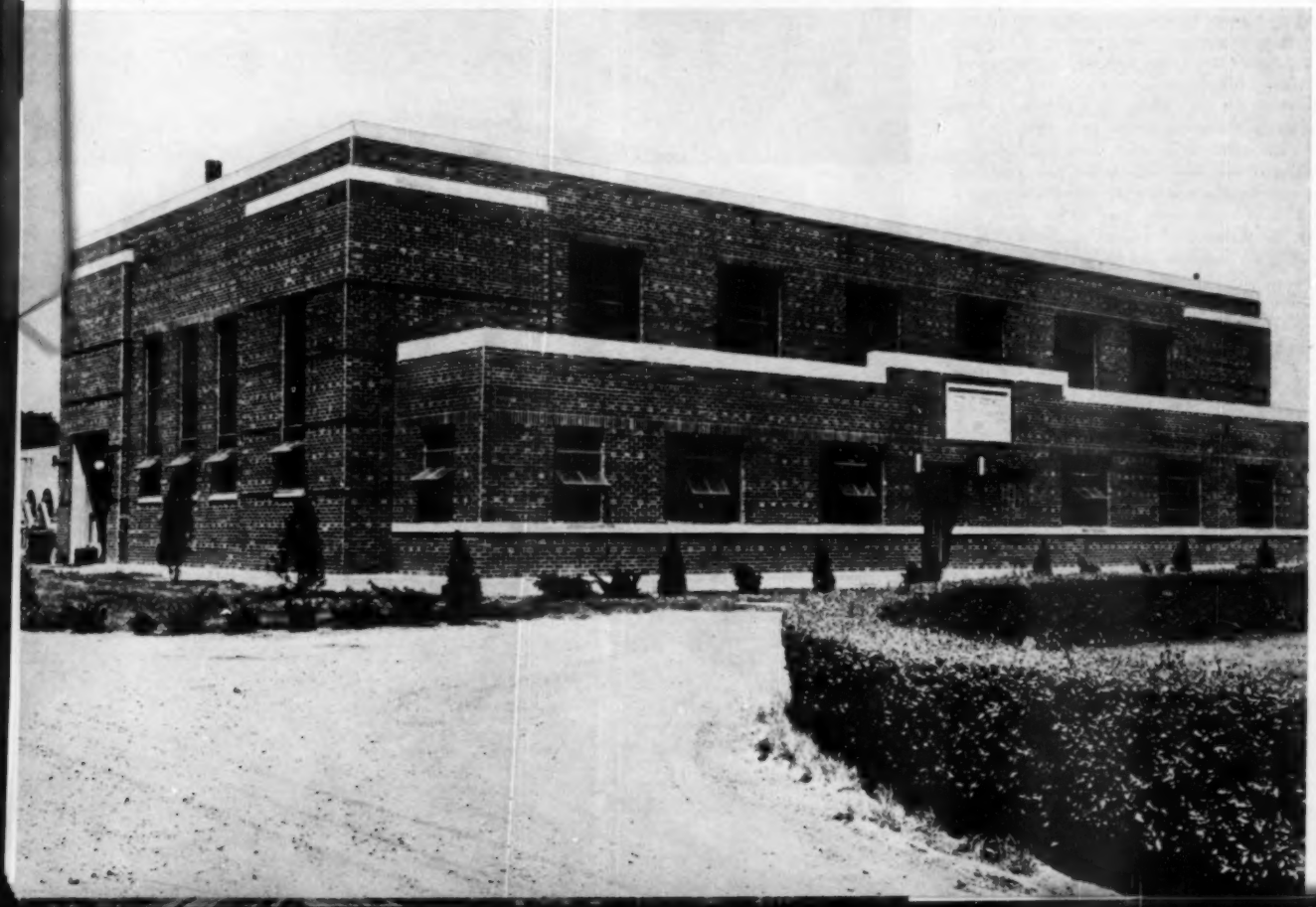
By M. L. BURGIN*

CITIZENS of Geneseo, Illinois, can well be proud of their electric utility and appreciate its value to the city. It is modern, well managed and profitable, but it was obtained only after a long struggle involving years of litigation. Prior to 1933 electric service had been supplied by a public utility company. In that year the franchise expired and a movement was started by the city to acquire its own power plant. It was believed that the city could profitably supply electric service and with greater dependability than that brought in from an outside source. From the time the plant was first under consideration, court procedure was almost continuous until May, 1944, when the utility company removed the last of its poles and lines.

Assurance that the city could supply its electric service profitably with diesels was no doubt influenced by previous experience with a diesel unit installed in 1929 in the city water plant. Purchased electric service for pumping was supplanted by a single cylinder, 70-hp. diesel engine direct connected to a centrifugal pump. This resulted in a material reduction in the cost of pumping and less probability of a failure of water service. After the city had acquired its own generating station, electricity was again used for pumping and the diesel unit retained for stand-by. When the diesel plant was placed in service in 1933, the generating equipment consisted of one 4-cylinder, 280-hp., and two 6-cylinder, 420-hp. Fairbanks-Morse engines. By 1940, the load had grown, necessitating the installation of another unit. This was also a 6-cylinder Fairbanks-Morse engine, but rated at 450 hp. Within two years the load had so increased that a duplicate unit had to be added. These five units gave the plant a total capacity of 2,020 hp., which seemed ample for some time to come. The load, however, continued to increase beyond expectation. In order to quickly provide some margin of safety in generating capacity, two 165-hp. continuous rating Murphy diesels were installed in 1946. These were immediately available from war surplus and being self-contained on skids, were easily installed and instantly ready for service.

These two small units did not materially improve the plant's overall generating capacity, particularly in face of a gradual growth in load. The next year, another Fairbanks-Morse engine was purchased, an 8-cylinder unit of 1,400 hp. There was no space available for the installation of this larger unit and extensive building changes were required. This presented a number of problems, since service had to be maintained while construction work was carried on. Part of the walls of the building were retained and after the new portion of the structure had been completed, the balance of the old building was removed. This expanded building provided ample room for the installation of future engines, since a smaller unit could be removed if necessary and a modern engine requiring less space per hp. could be installed in the same space. This procedure was soon followed.

* Plant Superintendent, Geneseo, Illinois.



By 1949, the load had increased, necessitating the installation of a still larger engine. In that year the 4-cylinder, 280-hp. unit was removed and an 8-cylinder, 16x22-inch, 4-cycle, supercharged Nordberg duafuel diesel engine with 1,475 kva. generator was installed in its place. While ample space was available for this larger unit, the installation presented quite a problem since the old foundation consisting of a block of concrete measuring 8x8x24 feet had to be removed. This was done with dynamite detonated with electric fuses. Heavy tarpaulins were hung around the foundation and the concrete base covered with old mattresses. Three ounce charges were set off to remove small portions of concrete with each blast. During the blasting operation, the plant continued in service and no damage whatsoever was done to building or equipment.

The existing plant layout and auxiliaries were such that a minimum of new equipment had to be installed for the Nordberg engine. Fuel storage was ample with five above-ground tanks with a total capacity of 80,000 gallons. Fuel is delivered to the plant by tank car to a switch track adjacent to the plant property. A transfer station delivers the fuel from car to tanks. Fuel flows by gravity to a fuel transfer pump in the basement, then through a heat exchanger, where the fuel is heated to 130°F., then through a felt pack filter and then to the day tanks for the various units. Also in the basement is a 3 gpm., 40 psi. fuel oil transfer pump driven by a ¼-hp. motor which delivers the filtered fuel oil to the Nordberg engine.

Neither was any additional cooling water equipment required for the Nordberg engine. All units have closed cooling water systems. There are two cooling towers. The larger tower, capable of handling 4,000 hp., has four fans, two thermostatically controlled and started when the temperature rises above 140°F. and two manually controlled. This tower has sufficient capacity for the plant's cooling water requirement and is presently in use. The smaller tower of 1,500 hp. capacity is held in reserve. There are five centrifugal cooling water pumps driven by 10-hp. motors. Two of the pumps are for raw water, two for jacket water and one, a swing pump, is so connected that it can be used for either raw or jacket water circulation. The raw water pumps take their suction from the base of the tower, part of the flow going through the heat exchangers for lube oil, and part through a by-pass valve. The two streams then join and the water is discharged through spray nozzles in the top of the tower, from where it falls over two banks of copper tubes which are in the jacket water circuit. The two banks of copper tubes serve the same purpose as heat exchangers usually employed for jacket water cooling. The jacket water pumps discharge into a common header from which the engines take their cooling water supply. With this arrangement warm water is circulated through the jackets of idle engines, making it possible to get them on the line more quickly than can be done with a cold engine. Furthermore, sweating and rusting are avoided when engines are kept out of service for some time. Both the raw and the jacket water are softened by separate softeners.

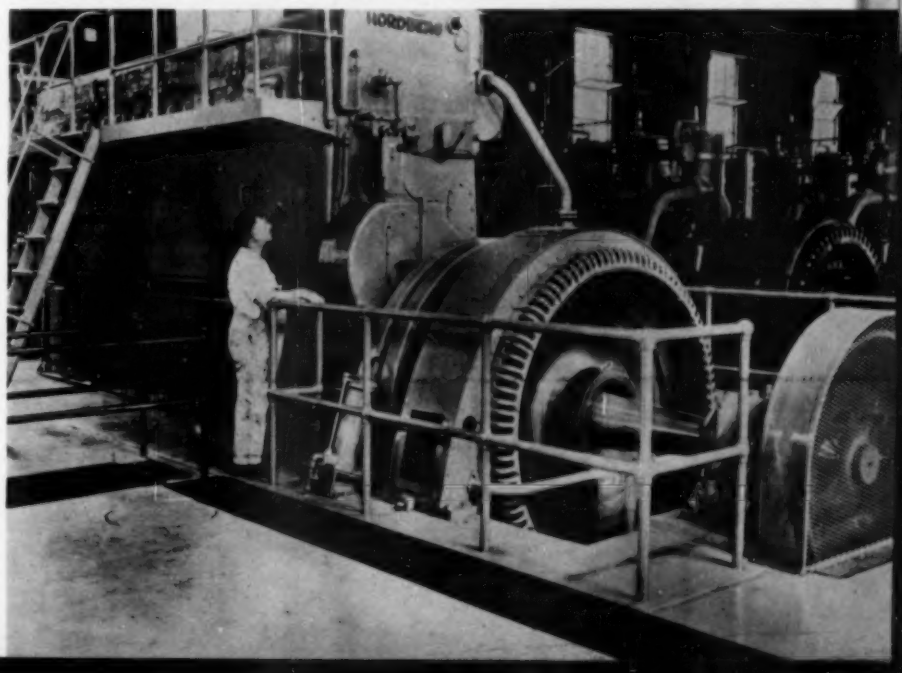
Lubricating oil is circulated by a pump of 170 gpm. at 50 psi. and driven by a 15-hp. electric motor. This pump takes its suction from the engine sump, discharges through a heat exchanger of 224 sq. ft. surface and capable of cooling 175 tpm. of oil from 160° to 138° by the use of 400 gpm. of raw water at 95°. From the cooler, oil passes through duplex strainers and then to the lube oil header on the engine. A purifier continuously by-passes a portion of the lube oil, returning the cleaned oil to the system. Adjacent to the engine at the operating end is a gauge cubicle. Mounted on this are the pressure and temperature gauges, controls and visual and audible alarms for jacket water, lube and fuel oils. An interesting feature installed by the plant personnel are duplicate lube oil circulating and fuel oil transfer pumps, so arranged with suitable controls that if the pump in service on either system fails, the duplicate unit automatically starts to function. Should a failure occur, warning lights appear and sirens sound at both the cubicle and the main switchboard, calling to the operator's attention that something is wrong and the trouble can be immediately located. In order to provide this double assurance against an engine shutdown, it was necessary to install additional 170 gpm. lube oil and 3 gpm. fuel oil transfer pumps in the basement with necessary control devices, switches and warnings at cubicle and switchboard.

Intake air is silenced by a silencer and filtered by an air intake cleaner with weather hood. The exhaust has a silencer. The entire engine room floor is served by an overhead traveling crane with the travel and a 2-ton hoist electrified and two hand operated 5-ton hoists. The output of the plant has grown from 993,616 kw. in 1934 to 7,778,000 in 1949. In 1937, a connection was made to the Farmers Mutual Electric Co., a rural electrification project. The first full year, this load amounted to 185,700 kwh., which in 1949 had increased to 1,654,600. The peak load for this service to date has been 490 kw., with an average of 350 kw.

The installation of the Nordberg diesel has resulted in a material improvement in kwh. production per gallon of fuel oil. The total generation for the first seven months of this year was 4,837,200 kwh. on 382,480 gallons of fuel oil. Of this the Nordberg unit developed 1,486,000 kwh. on 105,230 gallons. This gives the Nordberg unit a fuel consumption of 14.12 kwh. per gallon as compared with 12.64 for the whole plant during this period. While the fuel consumption of the Nordberg engine improves the overall efficiency, a much greater improvement will be made when natural gas fuel is available. This engine is of the duafuel type and will burn either oil or gas fuels on the full diesel principle. In other installations of this type engine where both fuels are available on a comparable basis, gas operation has resulted in a reduction of approximately 50 per cent in fuel expense. The installation of this last unit, the placing of the auxiliaries, the piping and the wiring were done by the operating staff under the direction of the author as superintendent and Al Sieben, chief engineer. The clean and orderly appearance of building and grounds, well maintained condition of generating equipment and auxiliaries and the dependable service rendered to the community, all reflect on the excellence of the operating staff.

List of Equipment

New Main Engine—Nordberg.
Generator for New Engine—Elliott.
Heat Exchangers, Fuel—Schutte-Koerting.
Fuel Oil Pump—Haight.
Cooling Towers—Diesel Service Company.
Cooling Water Pumps—Fairbanks-Morse.
Water Softener—Master Line.
Lube Oil Pump—Roper.
Lube Oil Cooler—Ross.
Lube Oil Purifier—Honan Crane.
Switchboard—Marquette Electric Switchboard Co.
Intake Air Silencer—Burgess-Manning.
Intake Air Cleaner—Burgess-Manning.
Exhaust Silencer—Burgess-Manning.
Pyrometer—Alnor.



OAKLAND, CALIFORNIA

Diesels in Many Portable and Fixed Machines Make Port of Oakland Highly Efficient in Handling Export and Import Items in Peace and War

By F. HAL HIGGINS

THE Port of Oakland, organized less than a quarter century ago, is moving into a high place among the ports of the United States. Your Old Reporter had to blink his eyes a couple of times and begin asking questions about what goes on along the waterfront on the east side of San Francisco Bay when he dropped in on officials of this busy port. He could recall over the past twenty-odd years hearing the name "Port of Oakland" at the time the airport out near San Lean-Leandro was laid out and developed by the old gasoline Caterpillar tractors before there were any diesels in tractors. A bit later he saw boats load combined harvesters for Russia from the San Francisco side. That was way back in "BB" (Before Bridges—both high and Harry!). All work was done the hard way, with armies of stevedores wheeling and carrying things to be loaded in the hold.

What is that with the Cummins engine in it with a flock of fork-lift trucks gathered around it like a litter of pups around their mother at dinner time? And who dreamed up that Buda diesel job with pumping tentacles? Incidentally the copra unloaders are Sutorbilt rotary, positive standard duty blowers, have flat nozzles, digger nozzle, two 20-foot lengths of 8-inch steel flex hose blower—at 325 rpm. it rates 120-hp. Buda diesel engine. The visitor was seeing diesels everywhere he looked. He immediately walked into the office of Cal. Robert Ericksen, terminal superintendent, and asked for directions on who to see and where to get the answers on diesels. The Colonel rose to the occasion to "point with pride" to men and machines who combine to make the Port of Oakland one of the best managed in the wide world of ships of sea and air. Here is the port-owned diesel line-up at the time of the visit as the Korean war was starting to make San Francisco Bay one of the busiest spots in world commerce: Diesel equipment, Port of Oakland—3 copra blowers (Buda power); 1 International Harvester; 2 Caterpillars; 2 Caterpillar patrol graders; fireboat with 5 units—2 McIntosh-Seymours, 3 Budas; 1 Schramm air compressor—UD18 International; 1 standby power unit at Oakland Airport—Hill diesel.

Now about the 2,400-acre Oakland Municipal Airport, since the writer's first contact with the Port of Oakland was in frequent noon luncheon visits to the tractor grader work as the airport was being dredged and filled from the mud flat of low tide, he cocked an ear to Port Manager and Chief Engineer Abel as he told the story of the air side of his job: "Operated and maintained by the City of Oakland, acting by and through its Board of Port Commissioners, the airport has a total area of 2,400 acres which will be fully developed under the Board's Master Plan for the future with 1,700 acres for airport operations and 700 acres for an airport industrial section. This Master Plan contemplates the construction of three sets of dual 10,000-foot runways. Fronting as it does on San Francisco Bay, the airport's development encompasses both land and water facilities. Immediately adjacent on the north is the Airport Channel from San Leandro Bay, with wharfs and other facilities for barging operations, as well as for the use of seaplanes. Direct rail connections are brought to warehouses and other structures on the field by means of spur tracks. With the Board eventually planning the development of piers and related harbor installations in San Leandro Bay, the airport will eventually be part of one of the most integrated air-sea-rail-land facilities in the West. Starting point of the pioneer Maitland-Hegenberger, the Dole Race, to Hawaii, the Smith-Bronte, and the Kingsford-Smith pioneer trans-Pacific flights when it was established in 1927, our airport was the Pacific Coast base of the far-flung operations of the Naval Air Transport Service during the war, as well as of the supply operations of the Army Air Forces. Since the conflict it has been utilized by major international airlines. One of the largest international activities at the airport is conducted at the home base of Transocean Air Lines, largest contract air carrier in the world. At its large conversion and maintenance base is the Aircraft Engineering and Maintenance Company, which was responsible for a portion of the maintenance on the Berlin Air Lift planes. Also located at the field is the base of the Pacific Airmotive Corporation, the helicopter center of Helicopter Services of California, the schools of the Aero Industries Technical Institute, Transocean Air Lines, and Airways Training Inc., the Naval Reserve Air Station, and other units are also here. Domestic air transportation is provided by United Air Lines, TWA, Western Air Lines, American Air Lines, and Southwest Airways. The last named is the western feeder system to the smaller communities of California and southern Oregon.

"The airport has safety and navigational devices, including ILS (Instrument Landing System). A VHF omnidirectional range has been installed, and a variety of other instrument improvements are being contemplated in the near future. Adequate hangar and warehouse facilities are available for all types of air transport and freight services. Other features include a modern restaurant, office building, International Terminal, Customs Center,

At the Outer Harbor Terminal of the Port of Oakland a vessel loads tractors for shipment to Europe.

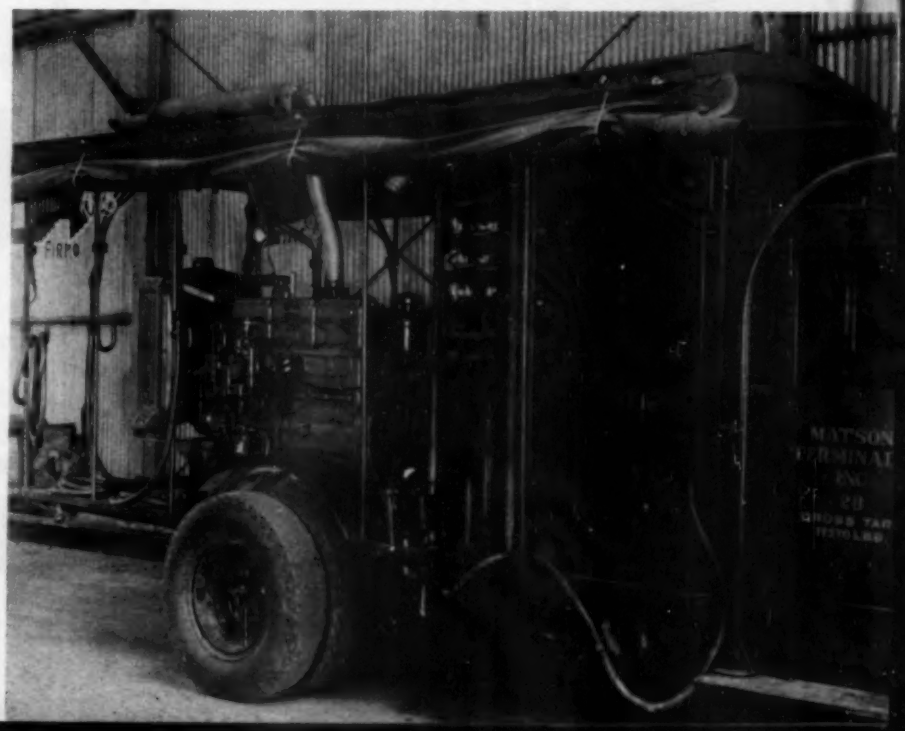
CAA Air Route Traffic Control, Weather Bureau, CAA Control Tower, and other federal and civil units connected with aviation."

Fireboat converted from Navy Tug – converted from a Navy harbor tug, the diesel-electric *Port of Oakland*, the first rank fireboat, with a 10,000 gallons per min. pumping capacity, has recently been delivered to her operators, the Oakland fire department. Claire V. Goodwin, president of the Oakland Board of Port Commissioners, described the new fireboat as one of the most effective marine fire fighting units on the Pacific Coast. Engineering of the conversion was done by Pacific Coast Engineering Company under the direction of Oakland's Port Manager, Arthur H. Abel, and his assistant J. G. Bastow. D. H. Relfe, mechanical and electrical engineer for the *Port of Oakland*, was in active charge of the entire job. The work was completed under contract by the Pacific Drydock & Repair Company, Oakland. The fireboat is berthed at the foot of Broadway in Oakland, immediately adjacent to a fire house from which she can draw her crew of seven hosemen and a battalion chief, and have them aboard within a very few minutes. A regularly licensed pilot and a marine engineer continuously man the fireboat. Under this arrangement the *Port of Oakland* can be fully manned and on her way at 14 knots speed almost immediately. Complete two-way radio telephone equipment permits coordinating the fireboat's activities with those of land based equipment and with other fireboats. A special short-wave radio installation keeps her in direct touch with Army, Navy and Coast Guard installations. The conversion job included the addition of three diesel engine pump units which were mounted above decks aft of the deck house. These three units add 6,000 gallons per minute of pumping capacity to the 4,000 gallons already available from two electric motor-driven pumps, to give the fireboat the total water capacity of 10,000 gallons per minute, available at a pressure of 150 lbs. psi. Seven large monitors and two hose manifolds are fed from the main pressure header which encircles the deck house at the upper deck line. A series of fog nozzles, mounted directly in this header, permit the fireboat to blanket herself in a protective spray when it becomes necessary for her to operate close-in to a fire. The *Port of Oakland* is powered by two 650-hp. McIntosh & Seymour diesel engines through Westinghouse electric drive. Two 515-hp. propulsion motors and a common reduction gear turn a single screw at 160 rpm. Below decks there are two electric motor driven fire pumps—each with a capacity of 2,000 gallons per min. The switching arrangements are such that the output of either or both main diesel generator units may be utilized for propulsion, or the output of one generator may be fed to the two electric motor driven fire pumps, leaving the other main unit available for maneuvering.

The three diesel engine pumping units were designed and manufactured by King-Knight Company, of San Francisco, who are distributors of Buda engines in Northern California. Each unit is complete with all auxiliary equipment in order to be totally independent of other equipment aboard. The 8-cylinder, supercharged Buda die-

She's all-diesel and ready to battle flames anywhere up and down the Oakland Port when flames break out. Five diesel engines—two 650-hp. Akos and three 8-cylinder supercharged Budas.

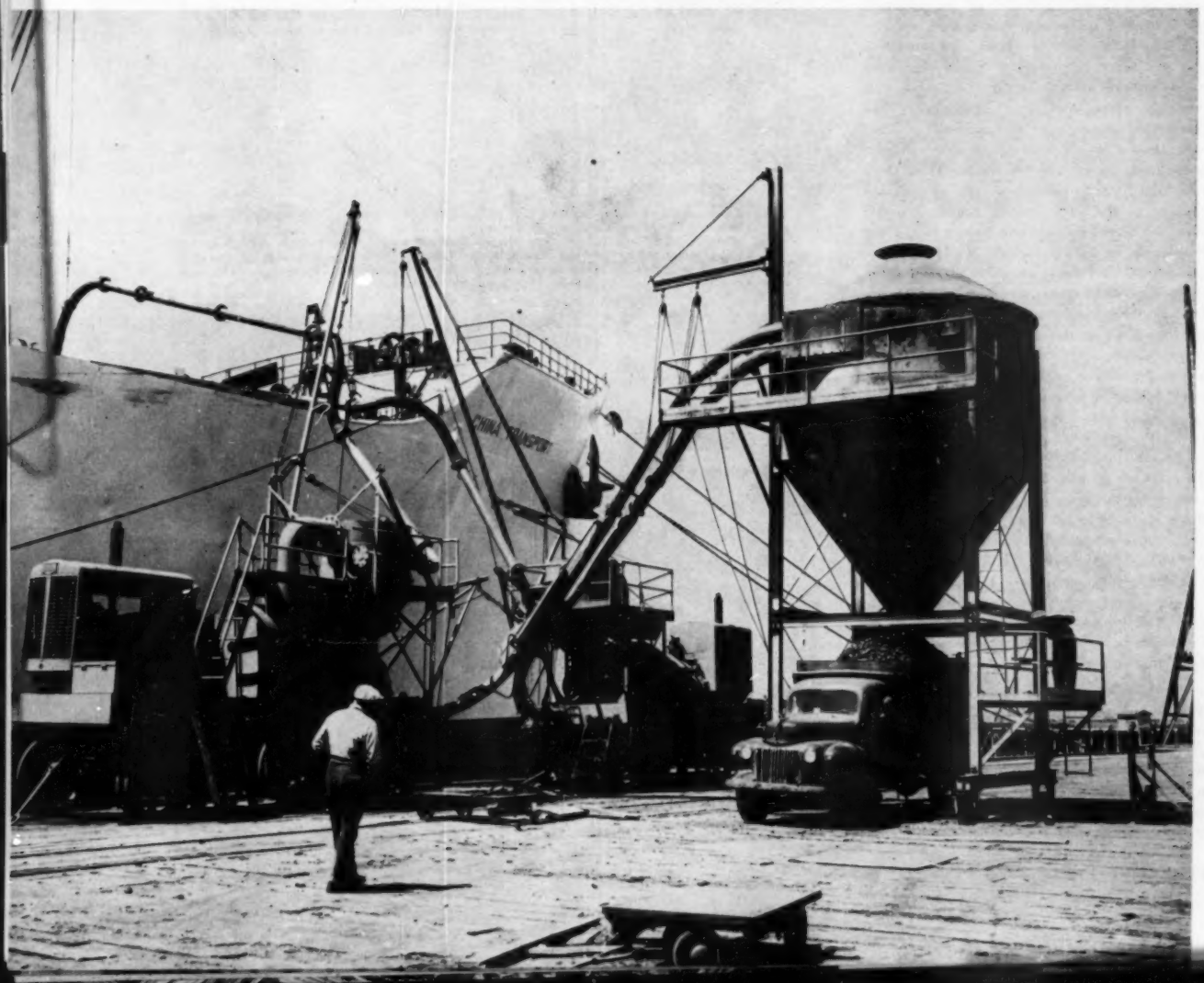
Cummins diesel engine model HIP-6 installed to power a 40 v. d/c generator owned by Matson Navigation Company in San Francisco. The generator is used as a portable charging outfit that follows their electric fork lift trucks from dock to dock, and can charge eight sets of batteries simultaneously. The engine is equipped with an extended crankshaft, vibration dampner, special flywheel, and connected with a Thomas flexible coupling to the generator.



sels turn at 1,450 rpm. to deliver 220 hp. to United Iron Works 6-inch, 2-stage, centrifugal pumps. Exhaust gas-operated jet ejectors are used to prime the pumps, which are about 8 feet above the water line. The engines and pumps are mounted together on heavy structural steel beds and are directly coupled together by Fabco flywheel type flexible couplings. Engine cooling is by fresh water circulated through the engine and a thermochanger jacket water cooler. Sea water circulation is from Marlow self-priming, centrifugal pumps, belt driven from the engines. Sheet steel housing having removable side panels protect the engines from the weather. Kittell exhaust silencers are mounted horizontally atop the housings. For emergency power and lighting a 300-ampere-hour Exide storage battery is provided. The *Port of Oakland* is 99 feet, 7 inches long, 25 feet, 6 inches beam, has a mean draft of 10 feet, 6 inches, and a displacement of 276 tons. In addition to the seven main monitors, she also carries aboard 3,000 feet of 2½-inch fire hose, 2,000 feet of 1½-inch fire hose, two foam generators and a considerable number of fog nozzles, and other fire fighting equipment. For protection against a fire aboard, both her engine room and motor room are fitted with CO_2 fire fighting equipment. The new equipment was called into immediate use the following morning after delivery when the fireboat was called to accompany the burning Matson freighter *Hawaiian Rancher* up the Oakland estuary to the Encinal Terminal in Alameda and help the fire department in fighting the fire on the listing ship.

The port began dieselizing way back in 1934 when the first motor grader was purchased, a check-up with port engineers disclosed. It was such an efficient unit that a second grader like it was purchased in 1938. The first diesel tractor was bought in 1944, in the midst of war effort, when the port was swelling with war effort and lots of work for both tractor and graders called for such investment. The remainder of the diesels came in with the end of the war and availability of war surplus goods. Every diesel piece has made friends and won a permanent home by its efficient cost cutting and solution of labor problems. To see the Buda-powered copra blowers unload a boat by reaching its vacuuming tentacles into the holds of boats arriving from the Pacific is a sight not soon forgotten. These three units pay for themselves very quickly and have solved a lot of headaches that go with San Francisco Bay water front activities the past few years. Another sight that stops the visitor is the Cummins diesel parked at the edge of the dock as the electric fork-lift trucks surround it and hook up for a recharging of batteries to keep them working with new life. It belongs to Matson Navigation Company and is on one side of the bay and then the other as it services the whole shipping area of the bay. It is a Model HIP-6 Cummins diesel engine installed to power a 40 v. d/c generator. This generator is used as a portable charging outfit which follows the electric fork lift trucks from dock to dock and can charge eight sets of batteries simultaneously. The engine is equipped with an extended crankshaft, vibration dampener, special flywheel, and connected with a Thomas flexible coupling to generator.

Pair of Buda-powered copra handlers unloading boat from Pacific and transferring the crushed cocoanut material to the hopper from which trucks load it for trips to margarine, soap and other factories in the East Bay areas.



DEALERS SEE BIG DIESEL DEMAND

Planting and applying fertilizer at one pass with Allis Chalmers HD5 diesel (GM engine) in the great inland empire of the Palouse country of eastern Washington and western Idaho.

THE fourth annual California Farm Equipment Dealers' convention held at Sacramento recently found the farm equipment industry emphasizing two things: It is getting braced for war controls; and it is going all-diesel as fast as it can meet the demands of western and export farmer and rancher. For the third year in the four years it has been held, a diesel dealer was elected president. He is Phil Livingston of Salinas, dealer in Allis-Chalmers and GM diesel lines at Salinas, King City and Paso Robles with his brother Frank. Frank Cornell and Charles Mathias, Caterpillar and International dealers, respectively, were earlier presidents.

Torrential rains with floods held the attendance down to 300-odd dealers, branch house officials, manufacturers, agricultural college engineers and press representatives for the 2-day event. Casual visits with acquaintances in the industry brought out the fact that every crawler diesel is being sold as fast as delivered to the dealer and big ones —D8's, TD24's, HD19's—are getting scarce as hen's teeth as the manufacturers keep increasing their production in an attempt to meet this demand of logging, contracting and governments all over the world for our "super-machines." As far away as Colorado, the writer heard from dealer salesmen that these biggest crawlers with the diesel hearts are getting so scarce they are not to be had these days. International Harvester Co., Allis-Chalmers (GM Engines), Oliver (Hercules diesel engines) and Caterpillar represent the crawler diesel lines, of course. The latter makes no other kind and swung over 100 per cent diesel some years before World War II to meet their world-wide demands. The other three are heading more and more to diesels with their bigger wheel models also changing to diesel to meet western and export demands for high efficiency and cost cutting that goes with this power. Oliver sent two or three wheel tractors equipped with Buda diesels out to California before World War II broke. International had several hundred high-cleat wheeled diesel tractors in the asparagus fields of the Sacramento and San Joaquin at the time war stopped their production. Those wheel diesels had enabled dealer George Gordon at Rio Vista to swing a lot of business from Caterpillar gas crawlers to his line, as Cat had no wheeled diesels. The crawler gas rigs had been doing a lot of row crop work that went back to wheeled tractors when the combination of air tires and diesel engines made it faster and cut costs at the same time.

Jim Ashton, down in the Salinas Valley is now offering Oliver wheel tractors with diesels in two sizes. Ashton has been able to compete successfully against the two big row-crop lines by offering the current Oliver 77 and 88 models in two sizes with diesels. The Oliver diesel wheels are also making considerable headway in Dealer Jim Engle's territories around Fresno out in the cotton, grape and alfalfa areas. The Massey-Harris contingent at this convention was just as high on its successes in enlarging a strong beachhead established over the past decade with its self-propelled combine. Now they not only have the lead with the combine, but their two sizes in diesels are also getting plenty of business in the West where the diesel is recognized as a big cost cutter for farming. But those who have diesels to sell also realize there are more coming soon from the tractor builders who now have their diesels on rugged tests down in the "heat-treated" Arizona Salt River Valley. Knowing that Case has a desert crew of research engineers down there putting their diesel tractor through its paces to get it ready for production at an early date, your old reporter quizzed two or three key Case officials. They admitted it was coming along fine and they hoped would be ready at an early date. However, no one knows

Murphy diesel engine powered Northwest dragline at work on the Peter Kievit section of the Friant-Kern canal that is to solve much of the San Joaquin Valley's water shortage and bring back to full flower many thousands of acres of farm lands that have gone back to the desert.

Teamwork by three HD19 Allis-Chalmers carrying natural gas pipe through wooded terrain. In background is clamshell and another HD19. The pipe line transportation of both gasoline and gas has become big business.

when until the factory gives it the go-ahead for sales. Minneapolis-Moline, Ford and Ferguson each has diesel tractors abroad in England. While not yet available in the U. S., it is known that each is planning to meet the competition at as early a date as possible. The West with its mushrooming population has a big trend to smaller farms around the big industrial centers. And these people are buying small farms by thousands with demands for small wheel tractors of both garden and "pony" sizes. Not only is the San Diego territory going small farm, but Oregon, Washington and California are all multiplying their small farming operations. Yet, there are still big farmers out beyond the urban fringes of these coastal cities where population has piled up during war and post-war years. The Pacific Coast States have had the biggest population gains in the U. S. in the past half century.

As all these California farm equipment dealers are also strong in their industrial, contracting and governmental sales for road and street construction, logging, oil field work, etc., the demand for diesels is all the stronger. Scarcely anything is seen on the big construction jobs other than diesels in power shovels and draglines, tractors on bulldozers, compressors, motor graders, pavers, rollers, slopers, canal shapers, etc. While the four lines that have the big diesel crawlers get the bulk of this business, the wheel tractors are finding more and more spots in industrial work. Minneapolis-Moline, Oliver and especially Case, as well as Ford

A General Motors Diesel driven Allis-Chalmers tractor seeding oats near Cayucos, California.

Allis-Chalmers HD14 tractor fording a shallow stream with logs in the northwest California area.

"Uncle" wants a big 1951 crop of wheat to insure ample food for whatever demands come up. This Allis-Chalmers HD5 is drilling seed and applying fertilizer to give the crop every opportunity that weather will permit.

tractors are all over the industrial map on the lighter jobs. Stan Hahn of Hahn and Mehrten, who built over 30 GM dieselized combined harvesters for rice in 1946-1948, says his shop will turn out more of these $50,000-a-unit machines for 1951. Dealers in industrial engines also report a big demand for diesel engines to power ranch-built machines such as bean, grain, and rice combines. Also for green crop harvesters for drying plants the International dealer at Madera has had a nice business that promises to enlarge.

Phil Livingston, the newly-elected president of the state dealers, is rated one of the shrewdest business men in the farm equipment industry. So, the writer took pains to get some slant on the present state of business and the future for diesels as this Allis-Chalmers, General Motors and Minneapolis-Moline dealer sees it from his coastal strip of territory from Salinas to Paso Robles, a stretch of more than a hundred miles with a well balanced farm, construction and government business. First, the U. S. Government will call the plays that will influence how much steel the manufacturers get for more tractors, combines, engines, plows, etc.

Not only will the Government decide how many will be built, but also take what it needs for Army, Navy, Marines and Sea-Bees before the farmer and contractor gets his demands in new tractors and equipment they push, pull and carry. But from there on, the demand will be all that can be found, and diesels get first call all around.

DIESELS BY THE DOZEN

Service Pipe Line Co. Expansion Program Adds More Than A Dozen New Engines. Additions Raise Total HP. to New High

By WILLIAM H. GOTTLIEB

IN a two year expansion program which raised oil handling capacity to unprecedented heights, the Service Pipe Line Company has added 14 new diesel and dual-fuel engines totalling 22,650 hp. to some of its active pumping stations. Further expansion at other stations (by supercharging oil diesels and installation of new electric pumping units) brought total active horsepower to a new high. Of equal interest to everyone who operates internal combustion engines has been Service's success in keeping old diesels at work over a long period of years utilizing as fuel whatever crude oils are available. A notable example is a pair of 25 year old Fulton diesels with a combined service record of more than 300,000 engine hours. We'll go into this more thoroughly in a moment.

The United States still has an expanding economy and petroleum products continue to be a vital factor in that expansion. Pipe Line movement of oil has increased 24 per cent since VJ day to a current annual level of 600 billion barrel-miles. Service, with pipe lines extending into 10 states, has been for decades a major transporter of petroleum and, naturally, has played its part in the industry's national expansion. Since the close of World War II, this company has laid more than 2,000 miles of pipe, of which more than 500 miles have been 20-

Interior of a station plant showing two new 1450 hp. *Fulton* dual-fuel engines in the foreground. A third unit, a 2150 hp. *Fulton*, is at the far end of the plant.

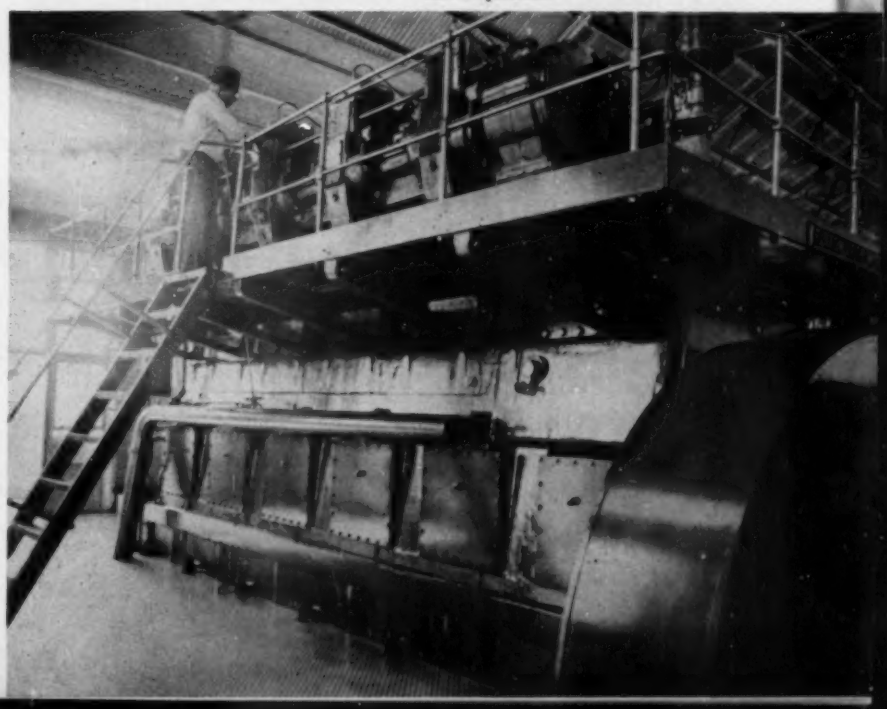
A typical station in the Service Pipe Line Co. system.

inch and almost 600 miles 16-inch. Construction of new pumping stations and augmentation of power at old stations have been a necessary part of this development program. Two 2150 hp. Fultons, six 1450 hp. Fultons and six 1575 hp. Busch engines were added at stations in Service's system. At one location three new Fulton diesels have been added, two rated at 1450 hp. and one at 2150 hp. The smaller units run at 277 rpm. and drive triplex horizontal Worthington pumps through Falk reduction gears with a ratio of 4.378 to 1. The pumps have rated capacities of 2895 barrels per hour at 1,000 lb. pressure and 3100 barrels at 940 lb. pressure which figures to loads of 1390 hp. and 1400 hp. on the 1450 hp. engines. The big diesel drives directly at 240 rpm. a 7-plunger vertical Aldrich pump rated at 4440 barrels per hour at 1000 lb., a load of 1920 hp. on the 2150 hp. engine.

But new engines are not the whole story. Service's engineers believe in getting the most out of their equipment and take every means to insure long, economical, unfailing service. A case in point is the pair of old Fulton diesels now in service at East Fort Madison. These 3-cylinder engines, rated at 520 hp. at 164 rpm., were installed originally on the Wyoming line in Nebraska in March, 1925. One was moved at East Fort Madison in June 1929, the other in July, 1932. In September, 1942, the fly-wheels were changed and the speed increased from 164 to 200 rpm. An Elliott turbocharger was added to one unit at the same time and to the other in November, 1944. These two changes effected an increase in power output from 520 to 930 hp. per engine. The original liners were in service until 1944, a total of 111,522 engine hours for one engine, 97,830 hours for the other. By September 1, 1950 the first engine had been in service more than 160,000 engine hours, the second more than 148,000 engine hours. The first unit has been in operation actually more than 70% of the elapsed time for 25 years. In the last 7 years, the average has been more than 87%.

The causes for this impressive durability and continuity of service are multiple: good, heavy-duty prime movers; good protective accessory equipment; a careful preventive maintenance program; sound operating procedures. It can hardly be said, though, that the engines are pampered. They work a long schedule under heavy loads and have a catch-as-catch-can diet. Fuel for the diesels is crude oil that is pumped through the pipe line. The pipe line company buys the fuel from the shippers, and an effort is made to provide mid-continent crudes when possible. At one station there is a 7,000 barrel storage tank which is filled when good crude is available. This also serves as a settling tank, for the oil is drawn off the top through an adjustable swing line to a day tank that serves all the engines through a common header. There is a duplex cartridge-type filter on each engine in addition to a disc-type filter. Asked what they do if they run out of good crude, Area Master Mechanic, O. C. Watson told this reporter: "We buy and use what is available." To counteract the possibly harmful effects of miscellaneous crudes on

This is the new 2150 hp. *Fulton* dual-fuel engine operating in this typical station of the Service Pipe Line Company. Five of the *Fulton* dual-fuel units are now operating on natural gas with a small quantity of pilot oil at considerable savings as compared with fuel oil operations.

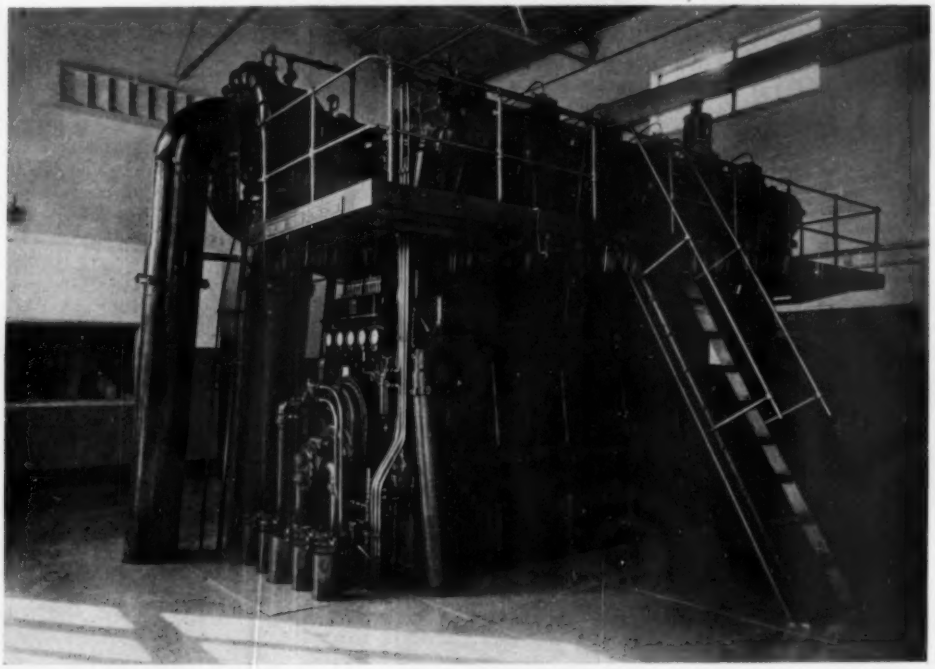


the injection system, the company specifies special steels for the injection nozzles and pump plungers.

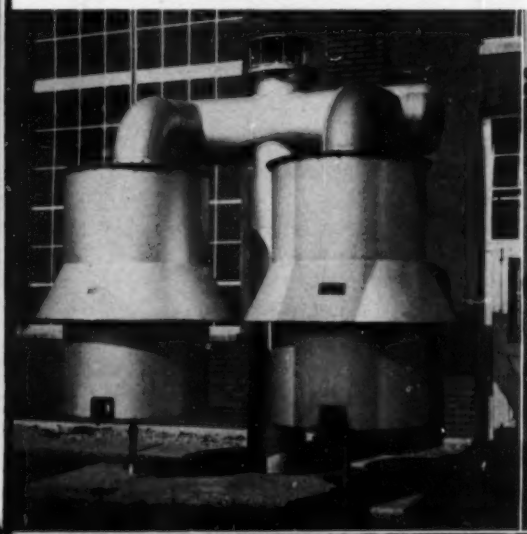
Five of the new Fulton's are equipped as dual-fuel engines and are now operating on natural gas with a small quantity of oil as pilot fuel. It is worthy of note that even a company with a ready supply of economical fuel oil can effect substantial savings through use of natural gas. A detergent-type lubricating oil is used in all units. Some oil from the pressure-lube system is by-passed continuously through a duplex waste-packed filter. There is an oil cooler included in the lube circuit for each of the new engines. Each of the new engines has a separate closed cooling water system with soft jacket water circulated by a centrifugal pump, chain-driven from the engine. The water flows through the engine jackets and a shell-and-tube heat exchanger where it loses heat to crude oil from the incoming line. An automatic thermostatically-controlled by-pass valve at the exchanger keeps water at the desired temperature. Engine air is filtered, in the case of the 1450-hp. units, through automatic self-cleaning filters. The plants have the protection of alarm systems with alarms and indicator lights on fuel, engine lube and turbolube pressures.

Obviously, it is essential to keep all the engines available for service and station engineers implement a thorough preventive maintenance program. Crankcase doors are removed every 30 days for a visual inspection of shaft and bearings. Every 90 days, they make a strain gauge inspection of the crankshaft and a pull-down check with an indicator and hydraulic jack. Pistons are pulled only when necessary; bearings are inspected once a year. Needless to say, any sign of incipient trouble brings quick action regardless of the schedule. Undoubtedly, Service's reputation for dependability as a transporter of oil is based on the company's unswerving allegiance to heavy-duty equipment and sound but progressive operating policies. In furtherance of those policies, it has been buying diesels by the dozen.

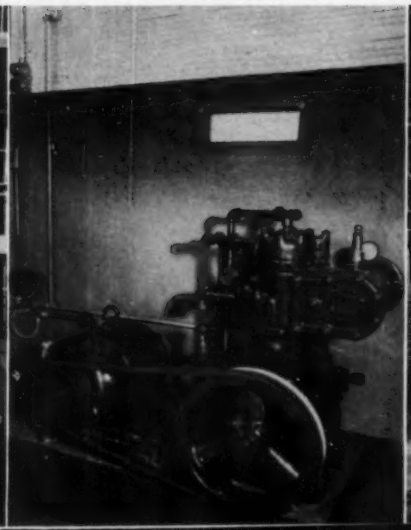
This close-up of a 1450 hp. *Fulton* shows the Nugent and Cuno lube and fuel filters, the Manzel cylinder lubricators, the Marsh pressure gauges and the Elliott turbocharger.



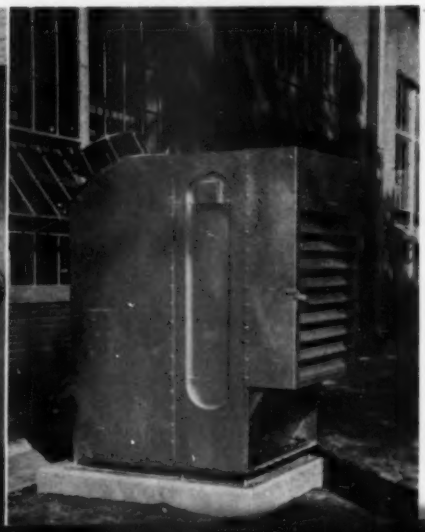
These American Cycoil air filters serve the new 2150 hp. *Fulton*.



Starting air is provided by Gardner-Denver compressors.



Engine air for the 1450 hp. engines is drawn through automatic self-cleaning American air filters.



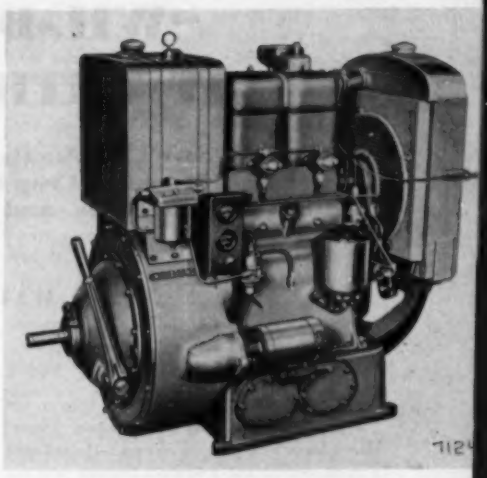
NEW SMALL NORDBERG

NORDBERG announces the addition of a two cylinder engine to supplement the Type 4FS1 single cylinder, 10 to 15 hp. diesel engine which has won acceptance in the small power field. This new engine, conservatively rated at from 20 to 30 hp. within an operating speed range of 1200 to 1800 rpm, has a 4¼-inch bore and 5¼-inch stroke and is an extra heavy duty, vertical, four-cycle, mechanical injection diesel engine. Known as the 4FS2, this engine is now in production at Nordberg's Milwaukee plant. Designed to assure the utmost in reliability, the Nordberg 4FS2 engine features low operating cost and heavy duty construction. It is built as a complete, self-contained, ready to operate unit and is offered as an electrical generating set, pumping unit and with clutch or stub shaft power take-off for direct connection or belt drive. This engine is also available for marine auxiliary applications.

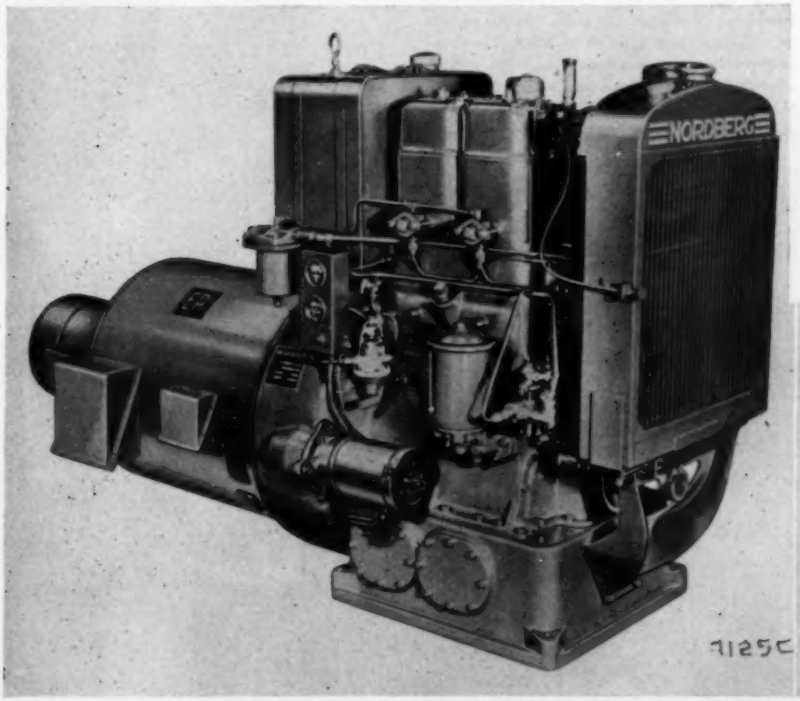
With the addition of the two cylinder engine, the Nordberg 4FS line diesel generating sets provides a dependable source of electric power, available in direct or alternating current models from 6 to 20 kw. in all standard voltages, 50 or 60 cycle. This unit is designed to generate light or power for shovels, cranes and magnets, sand and gravel plants, resorts, saw mills, oil fields, tourist courts, filling stations, etc., and for standby service for public buildings, telephone companies, hospitals, hatcheries, locker plants, dairies, etc. The 4FS centrifugal pumping units now cover a range of from 200 to 2400 gpm. at from 25 to 220 foot head and are applicable in the contracting and quarry industries for washing, draining, dredging and general pumping service, as well as in the irrigation field for sprinkler and flood irrigation. The power unit is applicable in the contracting and quarry industries, and also can be used for well drilling, and for driving compressors, blowers, saw mills, etc.

Nordberg 4FS2 engines are simply constructed to provide ease of maintenance and operation and are designed to start and operate on regular diesel fuels. Electric starting equipment including starting motor, battery charging generator and voltage regulator, is available on all models along with manual starting. The engines can also be supplied for manual starting only, if desired. Full pressure lubrication is provided to main, connecting rod, piston pin and camshaft bearings and the rocker arm assembly. Lubricating oil circulation is maintained by a gear type lubricating oil pump located in the sump. Lube oil entering the pump passes through a float strainer and is then circulated through a tubular heat exchanger in the engine block. From here is passes to the various pressure lubricated parts of the engine

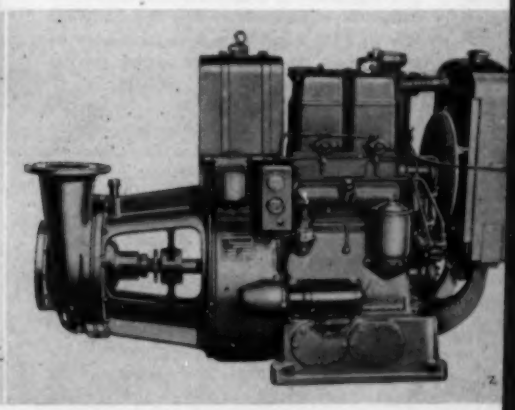
A diaphragm type fuel oil transfer pump, actuated by the camshaft, can also be operated manually for priming. It is arranged to deliver fuel through a filter to the fuel injection pumps. The injection pumps deliver the fuel to the injection nozzles at high pressure through heavy steel tubing. A mechanical flyball type governor, gear driven from the camshaft, regulates fuel delivered to the injection nozzles in accordance with engine load requirements. Engine speed is controlled by a simple adjustment of the governor. A radiator type cooling system provides efficient cooling of the combustion chamber, fuel injection nozzles, valves and exhaust passages. The fan and impeller type water pump is driven from the crankshaft. Automatic control of cooling water temperature is supplied by a thermostat and recirculating connection installed on the outlet manifold. Heat exchanger cooling for marine applications is also available and includes jacket water heat exchanger, surge tank, jacket water and raw water pump, and the same automatic temperature control features. The 4FS2 engine is another unit in the extensive line of Nordberg two and four-cycle diesel engines which range in size from 10 to 9600 hp.



Norberg 4FS2-BE with clutch power take-off for direct connection or belt drive, ranging from 20 to 30 hp. at 1200 to 1800 rpm.



Nordberg 4FS2-CE diesel generating unit for stationary and portable power applications and marine auxiliary uses, ranging from 12 to 20 kw. direct or alternating current, 50 or 60 cycle.



With centrifugal pump attachment, the Nordberg 4FS2-DE has a capacity of 300 to 2400 gpm. at 20 to 220 ft. head.

"WIL-DO" DOES IT WITH DIESELS

Waldo Weeth's Mechanized Ranch Has Solved Labor, Housing, Machine, Crop Rotations, "DP" Education, Duroces, Herefords and Certified Seed Problems

By F. HAL HIGGINS

Waldo Weeth and farm manager in his seed house with a 1930 crop of certified Ranger alfalfa seed worth over $300,000 at prices of November 10 last year.

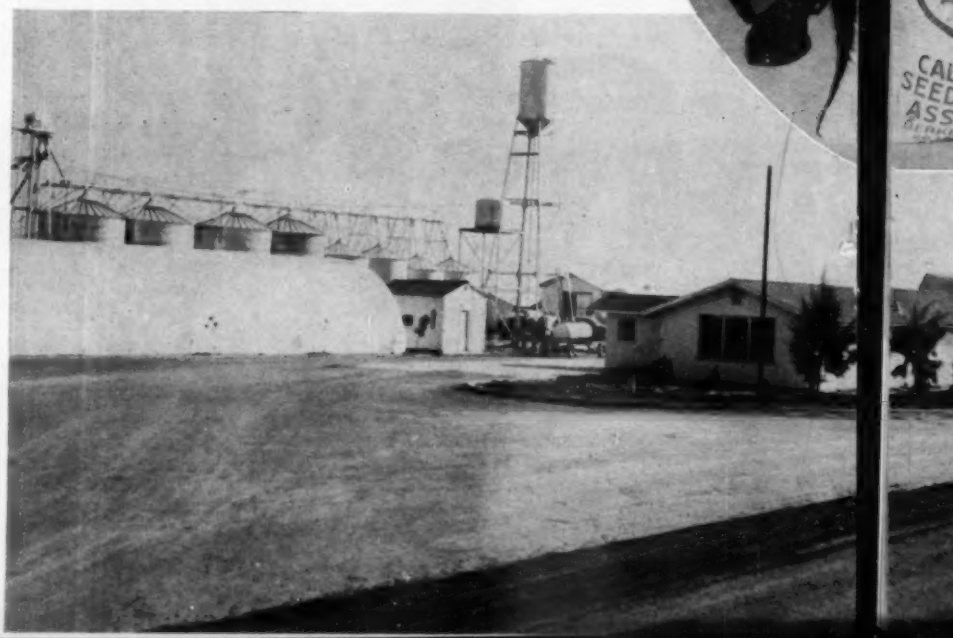
WALDO WEETH might have been picked by his University of California "Aggie" classmates as "one likely to succeed." He had been a good student and a football lineman who not only opened up the holes for his backs to make yardage and score touchdowns, but he had been an iron man in stiffening that line to the point where no opposing team scored at all that last year. He had been good at the start of his football, but he got better and better. That could have been the tip-off for his next twenty years had anyone bothered to peer into a crystal globe or read his tea leaves. For this fellow has been making agricultural history in a state that makes such history by the bushel, ton, mile, or whatever standard of measurement of farm progress you care to apply. In particular, he made it with machines, gadgets, gismos and gimmicks that were as practical as brass tacks in saving time and hard labor while lifting quality of farm products and profits by machine.

But let's go back and follow the rugged young "Aggie" grad as he went out into the world with his sheepskin in his hip pocket and that rarin'-to-go manner of the young grad looking for unconquerable worlds to conquer. Maybe the U.S. Government and the University of California thought they were giving the young fellow a spot that would cook the fire of youthful ardor to unlock the secrets of Nature in a rush when they shipped him to the blistering desert spot known as the Meloland Station near the Mexican and Arizona borders in the Imperial Valley. This spot is only a good look from the blistering area where General Patton trained his desert army for Africa in World War II. When it gets warm down there below sea level, it boils the thermometer up into the 120s in the shade.

University and USDA agronomists were busy developing a new variety of flax at the time our ex-footballer went on the job at Meloland. He did not slight the careful and accuratae hand jobs required in planting, fertilizing, weeding, harvesting and cleaning the seed of the new variety of flax being developed for the California growers to put them on a single variety crop as was proving so successful with cotton. But flax is a tough seed to get out of its natural setting and old time threshers go to a lot of trouble to get the proper screens into their threshing machines for threshing flax. Weeth noted the trouble his little thresher had with flax and investigated. He glanced up at his clothes wringer and wondered what would happen if he ran a few heads of flax through the rollers to squeeze the seed out instead of pounding it out by beating flails as in the past. He tried. It worked. He let the flax folks know and they backed the idea by having several combines built by Hal Thoen of Stockton with the rubber rollers installed to squeeze the flax seed instead of whip it. Weeth got so sold on the possibilities of flax that he went over into the far west side of the valley in the shadow of the Kettleman Hills of oil fame and started farming. When harvest time came, he used the rubber roller-equipped combines built for him by Hal Thoen. Also, he went to raising grain as a rotation. Always he was a stickler for clean crop for marketing and good seed for his next crop. His USDA training came in handy then. It still does.

The whole west side of the San Joaquin valley is a fresh saga of men with vision and know-how in developing farm lands and rising from shoestrings to millions. There is an ex-oil truck driver who went into farming who after 15 to 20 years of weathering the depression and riding the World War and post-war plateau of farm prices has organized his farming operations as a million dollar

"Wil-Do" ranch-office at right.



Weeth's "Wil-Do" ranch grain bins at headquarters.

corporation. There is a cotton farmer who was so broke at the bottom of the depression his tractors and other equipment were taken away from him, but who staged a comeback that lifted his operations to a sale of his cotton alone for over $4,000,000 last year. There are dozens who have become independently wealthy in developing the raw land into little empires of cotton, grain, potatoes, flax, melons, dairy farms, etc. So, one would expect the ex-tackle with the scientific mind and practical outlook to get ahead with his farming. He did, the writer noted, as he dropped in to see his flax and grain cleaning in 1939. Again in 1945 to see his pure-bred hog layout aimed at balancing his farming and meeting a California shortage of home grown pork. When Weeth was invited back to his old alma mater to tell the annual farm machinery conference at the University of California Agricultural College, it was no surprise to know he was a diesel-minded farmer who was still branching out into more activities.

"Waldo Weeth has made a million dollars with his certified Ranger alfalfa seed," casually remarked the County Advisor of Fresno County, recently. Recalling that the speaker had covered his Ranger alfalfa seed mechanization in his talk last January, the visitor looked back over that talk. Weeth gave most of his "Getting the Most Out of Farm Machinery" talk on his alfalfa seed- and cotton operations. He owns but 500 of the 4500 acres he farms, renting from Standard Oil of California and another big land holder. With Weeth's operations so close to the Standard Oil holdings in and around the Kettleman Hills, the land holdings would naturally be in big hands and held for the future development of the oil underneath the ground.

Three big crawler diesel tractors of the D-6 model do the heavy work on Weeth's farming operations with two of his seven Farmalls being MD (diesel) models. The crawlers are busy all over the place every working hour of the day, month in and month out through the year. But those wheel diesels do a job, too, doubling with cotton pickers on their backs as they run backward in picking cotton alongside two of the gasoline jobs. Weeth plants his alfalfa in rows 40 inches apart,

Skilled labor is employed year round and its families housed in modern cottages. They know their diesels on IH Farmall MD's for cultivation and cotton pickers also Cat D6's for plowing, discing and heavy ranch work.

just as he does his cotton. A 4-row planter is used, being converted in his own shop for his multiple job. A selective spray is used to control weeds, spray rig being carefully checked and tested before application. A light cutting of hay is made early to remove a watery growth that produces little seed. Here comes the bee, that busy little stinger that has had such a rough time in surviving the dusting, spraying and general ignorance of its importance the past few years. Weeth recommends a stand of bees to each acre of alfalfa when in bloom to get the heaviest stand of seed. The bees do the pollination job by flying about from blossom to blossom at this stage and don't like to fly more than 300 feet, say some of the bee specialists. Others who tested out bees at different spacings from as heavy as recommended, one-half to one-quarter as many declare they found no difference. We'll take Weeth's suggestions of a hive to an acre since he let us peep into his bonded seed warehouse after it was all harvested, cleaned, bagged and certified in a stack containing over 500,000 pounds worth over $300,000 for this 1950 crop! Nor will we dispute that County Advisor's tip on Weeth's importance in the production of Ranger alfalfa seed.

Weeth uses John Deere combines, three of the late model Deere No. 55 self-propelled models and two of the older pull type filling his combine house at the end of the season. They do a double job of harvesting barley earlier, then being cleaned and serviced for the alfalfa seed harvest in September-October. The alfalfa is defoliated by plane spraying before seed harvest. For his Ranger seed, he goes to Montana to get first generation foundation seed each year. No matter how many hundred thousand pounds of this certified Ranger seed he grows each year, he uses none of it for his own crops. It is all sold over the U.S. and carries the original cold climate hardiness from which it came.

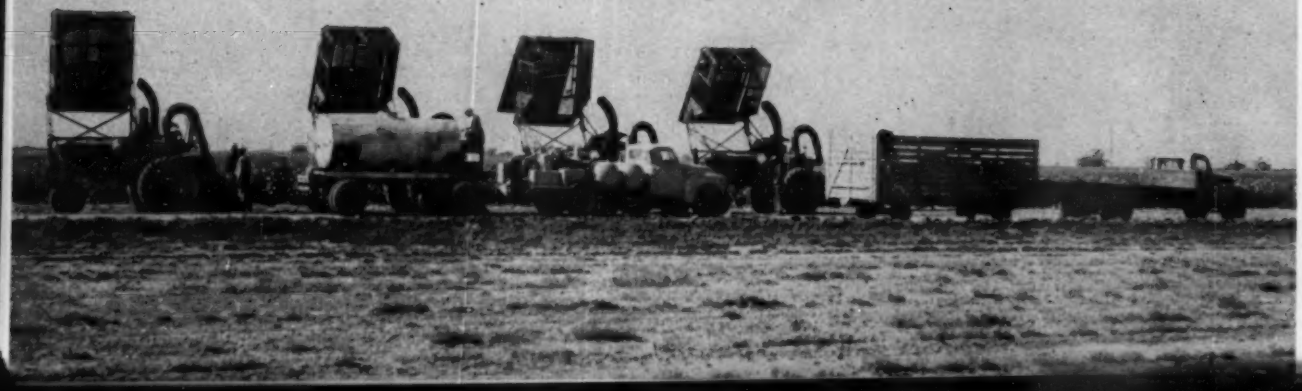
One big element in making the "Wil-Do" ranch operations click is the skilled labor kept on the ranch by installation of modern cottages for each individual family. So important has this anchoring of skilled labor that knows the farm, the machines, and the ranch become, that Weeth this year added eight more new cottages to his street of neat cottages with landscaping, bath rooms, running water, electric lights, and all the modern conveniences. There were already four such cottages for his older employees with families. With the elimination of hand picking of cotton, his work crew is now geared to year-round employment at good wages and homes on the ranch. One new note that shows Weeth's breadth of vision and understanding of the human element in his plans for the future was the introduction of two DP families from Holland and Germany. They are now installed in two of the new cottages and are getting two courses of training: first in the English language and next in the use of machines in farming as done at Wil-Do. The futures of these families will be worth watching.

The writer took his cameraman and hurried out to the fleet of four cotton pickers to catch the crew at lunch with their machines drawn up around the service truck. A glance at the pickers proved two were diesels, the MD Farmalls. They would all be diesels had diesels been available at the time they were bought during the war and post war years. The men on the cotton pickers were an interesting lot, two being Mexicans and two of the old American type. As these fellows each drew about $15 a day on their cotton picking job last year based on $1 an hour or bale basis, whichever proved better, it showed the opportunities being offered and taken by the farm labor from below the border. Many old time California ranchers have always liked the old time California-Mexican for ranch work because of his steady and faithful application to the job.

Another community chore taken on by Weeth is service on the school board. He takes great pride in having eliminated child labor from his cotton fields by putting machines in the field and giving the kids full time in school. More recently the Union High School of Coalinga put in a vocational agricultural department. This year, they went on to plan a school farm of 100 to 160 acres for a school farm laboratory. So, the next generation of farmers is in the plans for a still bigger and better agriculture in the Coalinga area of Kettleman oil reservoir and the Weeth Wil-Do ranching operations.

One of two IH MD diesel Farmalls caught on the famous International cotton picker at Weeth's "Will-Do" ranch. These two diesel Farmalls step out of cotton picker harness at end of picking season and do regular row crop work in cotton and alfalfa cultivation in season.

Lunch time on "Wil-Do" ranch where a fleet of 4 IH cotton pickers are harvesting Weeth's 1950 cotton crop without any hand picking. Two of these 4 Farmall tractors are MD (diesel) models. The ranch service truck is supplying diesel fuel, gasoline and lubricants as operators eat.



DIESEL-ELECTRIC GRADER MACHINES

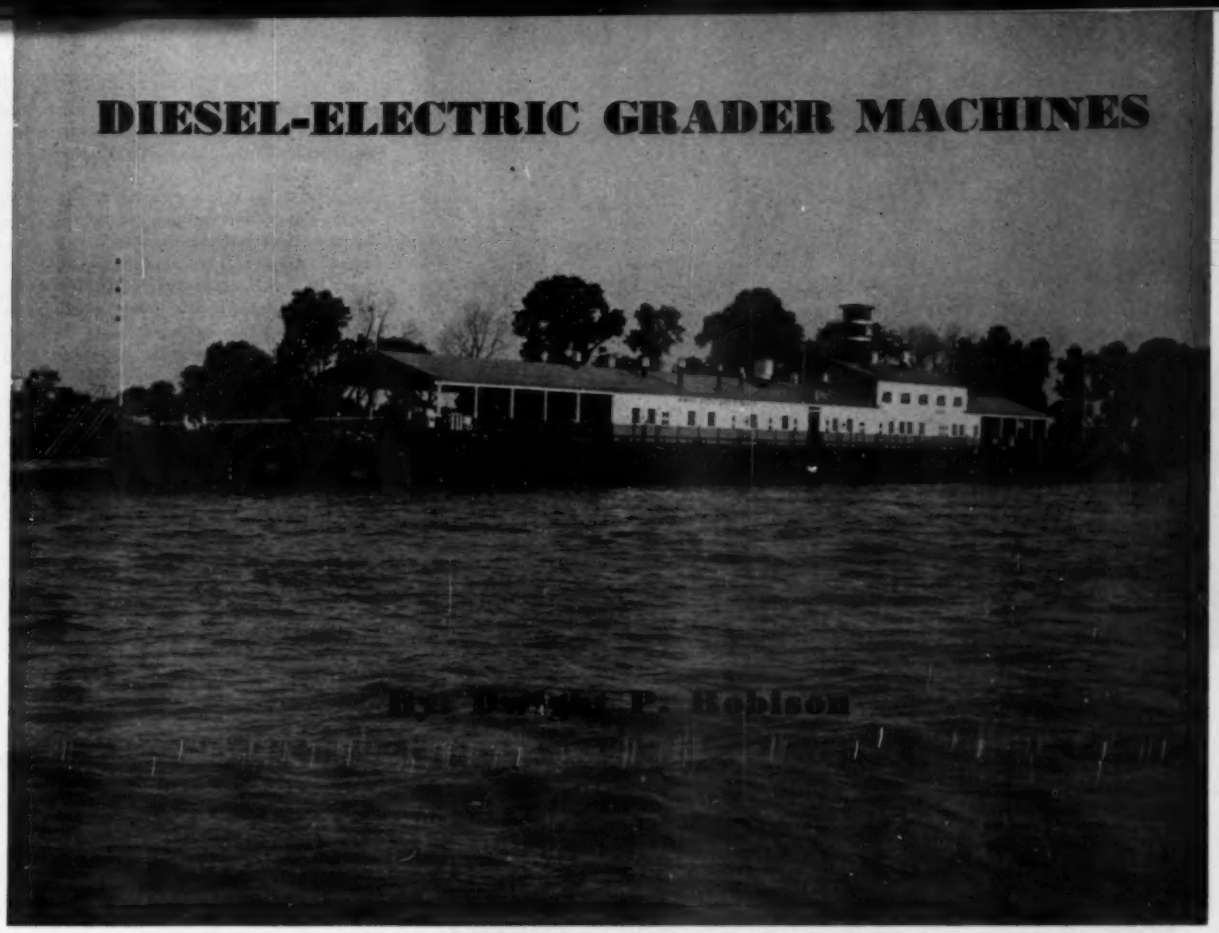


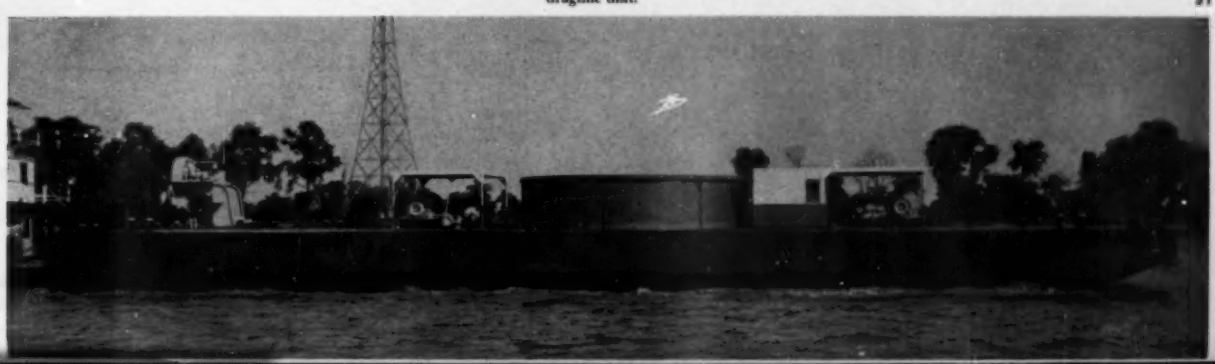
Figure 9—Mooring barge and power plant for bank grader. Note recess in side of hull to receive traveling connection from grader unit.

THE FIRST two diesel-electric dragline grader machines operated by the Memphis District, U. S. Army Corps of Engineers, will be placed in operation on the lower Mississippi River in July, 1951. The machines, which were completed in December, 1950, are electrically operated, with current obtained from diesel-engine generator units installed on mooring barges. They will supplement three steam-operated grader outfits owned by the Memphis District, Corps of Engineers, and will operate between Cairo, Ill., and the mouth of the White River, near Rosedale, Miss. The Vicksburg District, Corps of Engineers, also operates three steam-driven, dragline-type bank graders. The diesel-engine-driven main generator is rated at 750 kva. 4160 volts and is driven by an Alco, six-cylinder, 12½ x 13, 975 bhp. 720 rpm. turbocharged engine. Its brake mean effective pressure is 112 pounds. The main generator supplies current for operation of all motor driven auxiliaries on the mooring barge as well as for the winch motors on the grader barge and the motor generator set and auxiliary load on the grader machine.

Diesel electric was selected with a view toward economy of operation, convenience and cleanliness. Requirements for the diesel-engine power plants were reliability and operation at ratings and speeds considered suitable for long life and a minimum of maintenance. In addition, it was of utmost importance that the main diesel engine maintain constant speed, and that generator voltage change be held within narrow limits, despite extreme fluctuations in load inherent in this type of application. In order to assure the exact regulation necessary, a heavy engine fly-wheel was applied to the Alco diesel by the manufacturer to stabilize rotative speed, and sensitivity of the Woodward UG-8 governor was increased. The engine-generator set is directly-connected, bolted to the subbase and mounted on vibration dampers. This eliminates the possibility of hull distortion affecting main bearing alignment. All piping is connected to the engine by means of flexible connections.

The four-cycle, in-line engine is equipped with turbocharger of Alco manufacture. The turbocharger is a self contained unit composed of a gas turbine and a centrifugal blower. Babbitt-lined, sleeve bearings for the turbocharger shaft are located outboard of both turbine and blower for accessibility and greater reliability. More than 4,000 Alco six and eight cylinder standardized engines have been put in operation in locomotive,

Figure 8—The grader barge before installation of the Bucyrus-Erie Class 9-W, electric dragline unit.



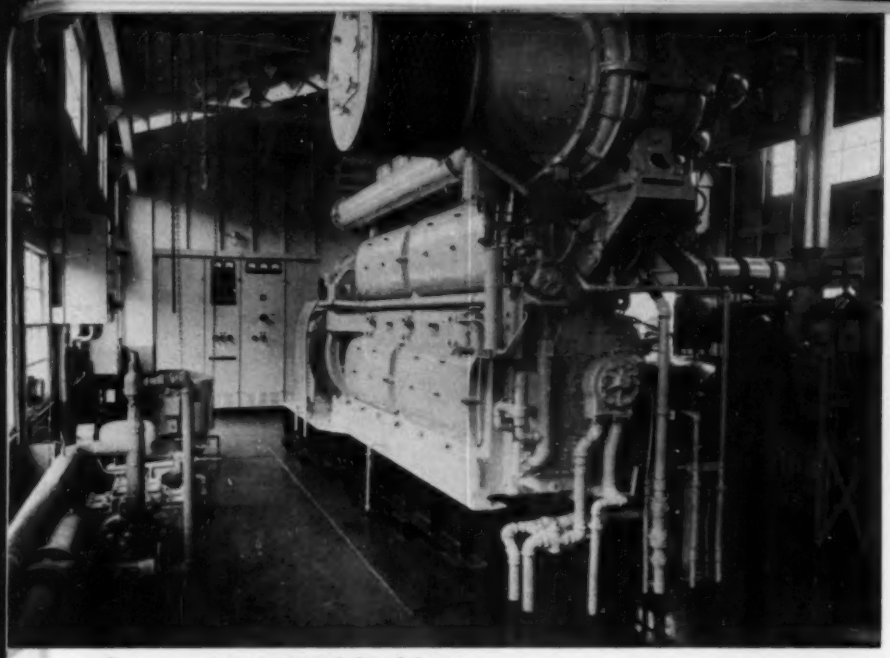


Figure 1—**A general view of the generator room with fuel and oil pumps, lubricating oil pump and Honan Crane lube oil purifier in background. Alco 975 hp. 6 cylinder, turbocharged main generating set in foreground.**

pipe line, marine and stationary power service since the general design of the engine was developed in 1932. All are now in operation except those assigned to naval or military service. Two other generator units are installed on the mooring barges. The auxiliary generator is rated at 250 kva. 480 volts and is driven by a Caterpillar, D-375, eight-cylinder, 5¾ x 8, supercharged engine. The standby generator is rated at 37.5 kva. 480 volts and is driven by a Cummins model HRIP engine. All generators are 60-cycle, 3-phase and together with their exciters were manufactured by the General Electric Company. (Figures 1, 2 and 3).

The grader machines will be used to grade banks of the Mississippi in preparation for the placing of revetments—consisting of an under-water, concrete mattress which extends from slightly above the waterline to the deepest part of the channel.

A blanket of hot sand and asphalt or riprap will overlap the concrete mattress and extend to the top of the bank. (See Figure 4, "Sketch of Revetments"). The bank is graded to a slope varying between 1:3 and 1:4, depending on the type of material in the bank. Normally the two machines will grade from 40,000 to 50,000 cu. yds. per day. Operating arrangement of the grader machine is shown in Figures 5. (Mechanical Bank Grader Unit Operating Arrangement). The outfit consists of a mooring barge—containing the diesel plant, maneuvering machinery, machine shops and storerooms—and a grader barge—equipped with electric dragline and maneuvering winches. Both barges are of welded steel construction and were completed by the St. Louis Shipbuilding and Steel Company in July, 1950.

On the grader barge, equipment consists of the electric dragline with a 183-foot boom, built by the Bucyrus-Erie Company, and two double-drum,

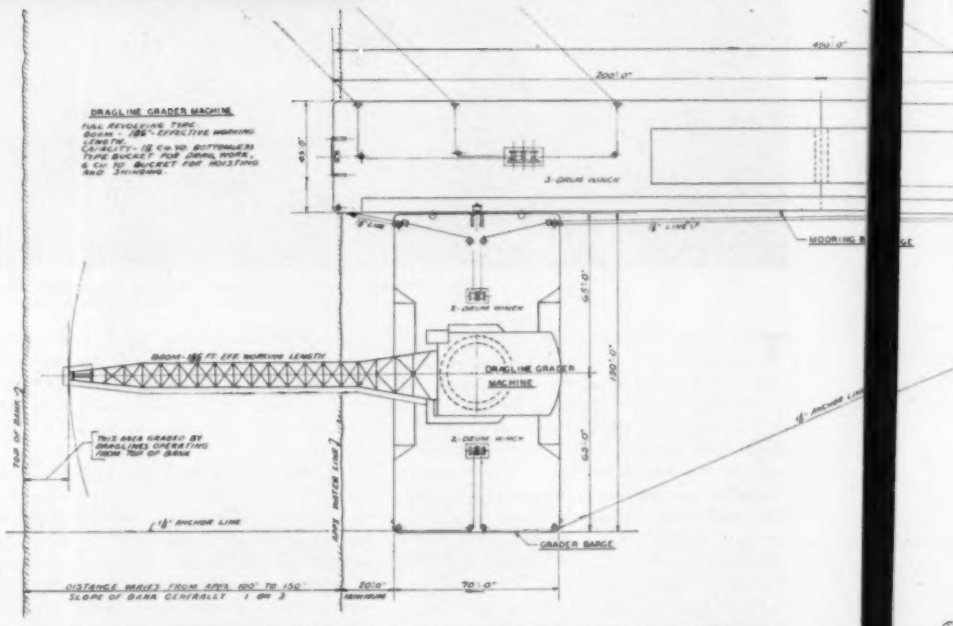
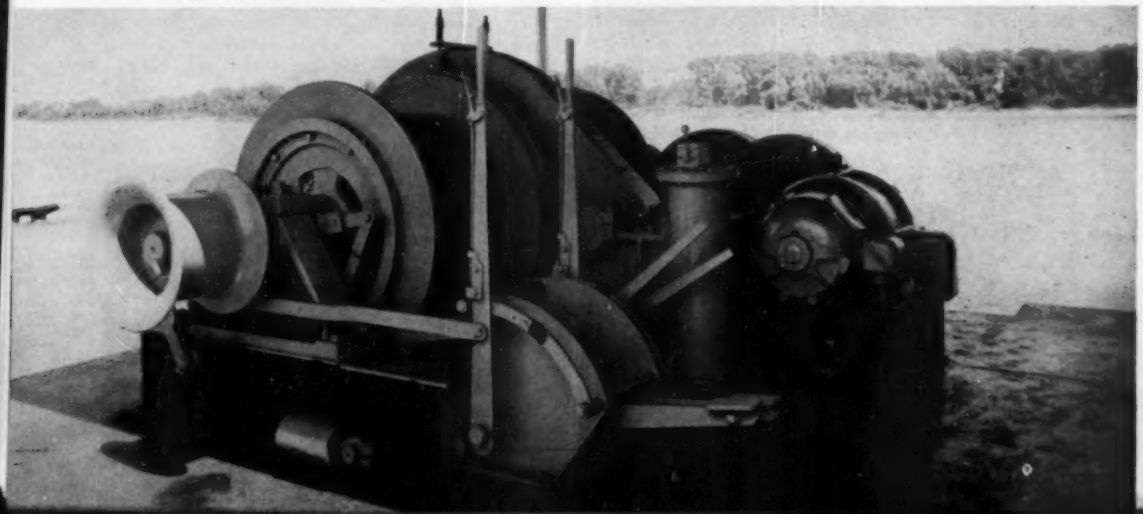
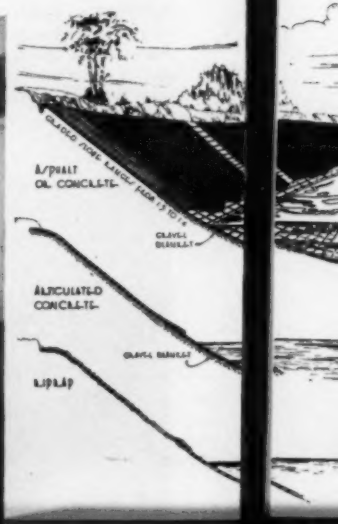


Figure 7.—**Two double motor operated maneuvering winches built by Superior-Lidgerwood-Mundy Corporation. On pages 52, 53 and 54 of the April issue of DIESEL PROGRESS, we ran an article tying in with this installation titled "Diesels Plus U. S. Engineers Equals Flood Controls."**





motor-operated maneuvering winches built by Superior-Lidgerwood-Mundy Corporation (see figure 7). One winch is for moving the grader barge along the 400-ft. mooring barge. The other is for check cables running to the bank and end of the mooring barge. The length of haul in grading the bank varies between 100 and 200 ft. Material removed from the upper bank is dragged down into the river, to continue the bank slope, by a 15 cu. yd., bottomless-type bucket. The grade is continued below water to depths as great as 30 ft. The grader barge has a 70 ft. beam, 130 ft. length, and 8 ft. 6 in. depth. Freeboard with the dragline machine installed with be approximately 5 ft. (see figure 8). The grader barge is connected to the mooring barge (figure 9) by a flexible, steel-rail-and-dolly connection. Winches move the grader unit as required. The mooring barge has a beam of 45 ft. and is 400 ft. long. The grader barge received its power from the mooring barge through a rubber-covered portable cable in connection with a torque-motor driven automatic take-up reel installed on the grader barge. (See figure 10). Power distribution to the mooring barge and grader barge is through G.E. switchboards and control equipment.

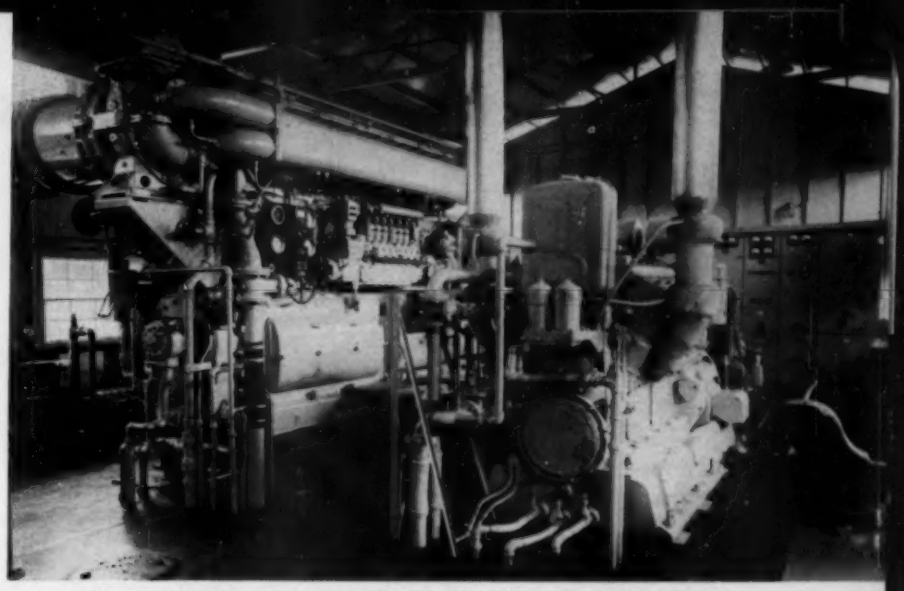


Figure 2—Main Alco generating set to the left and Caterpillar auxiliary generating set rated at 250 kva. supercharged to the right. All generators are General Electric. Almor pyrometer on main engine.

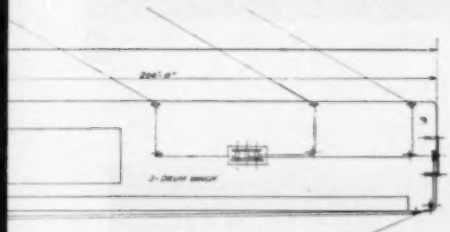


Figure 5—Mechanical bank grader unit operating arrangement.

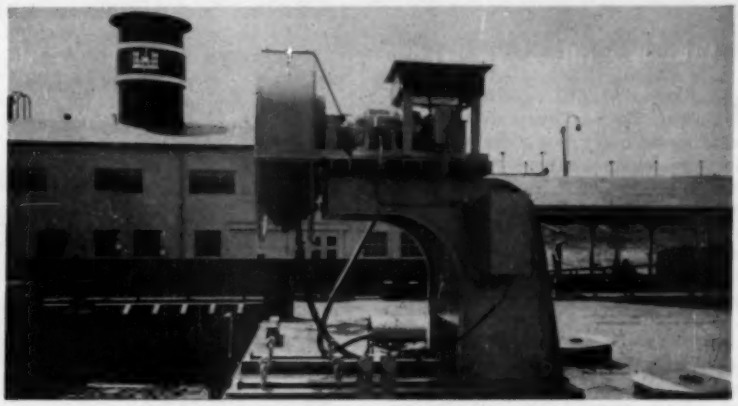
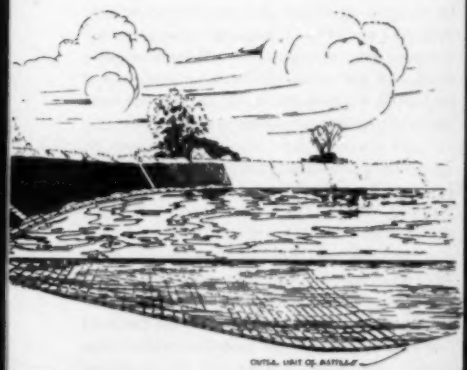


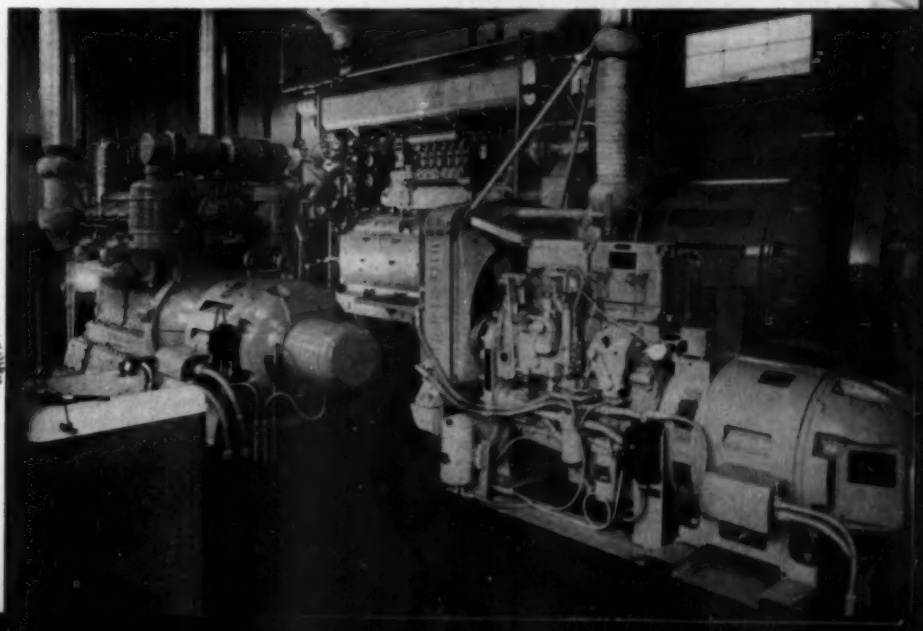
Figure 10—J. L. Gleason and Co. automatic cable reel used in transferring power from the mooring barge unit.

Figure 3—Cummins standby generating unit, a supercharged 37.5 kva. Model HRIP unit in the foreground. Caterpillar diesel auxiliary unit left and Alco main diesel generating set in rear. Korfund vibration isolators under all three diesels.

Figure 4—The purpose of this project is the progressive revetment of caving banks to protect the foundations of the levees and to stabiliae the river for both flood control and navigation.



SKETCH OF REVETMENTS



NINETEEN MEXICAN SHRIMPERS

By: Charles F. A. Mean

NATIONAL STEEL & SHIPBUILDING COMPANY of San Diego is a unique enterprise by practically any Pacific Coast standard or yardstick you might apply. Sprawling over a large section of the south end of San Diego Bay waterfront is not one shipyard, but a collection of seven distinct types of steel-working enterprise, on a beautiful "campus" that would make one of Henry Kaiser's recent wartime plants on the Columbia River look small! National Steel, the new name for National Iron Works, is a structural steel fabricating, equipment manufacturing, pipe plant, tank and boiler plant, machine shop and foundry, plus a shipyard division that is actually bigger than any San Diego unit-type boatyard—all rolled into one!

Way out on the "Campus," with plenty of room to pile plates, timbers and equipment, not to mention a marine railroad and several launching ways and an outfitting dock, is the shipyard division run by youthful, sharp-eyed, Geo. A. Dew, all replete with his own office and "brain trust" staff, about ten minutes bicycle ride from the front office out beside Harbor Drive! Bicycles and motorcycles are used exclusively for interplant and intraplant transportation and it gives a picturesque touch to be tootled out of the way by an elderly gentleman complete with pants-clips spinning his high-wheeled bike around with a basket-full of messages and parcels!

National Steel has just completed a semi-mass production job on nineteen identical all-welded steel shrimpers for Mexican fisheries and is now busy on a fleet of fine tuna clippers to swell the 1951 fleet by four of the giant-size ships. The shrimpers are of plain, almost barge-like design, easy to build, cheap to operate and simple to maintain, and are ideal for the calm, warm-water inshore fishing job they have to perform. Each is 54x17 ft. overall. They each carry a single small diesel that does all the work, carry a small crew and are stripped down to "economy size" at every turn. They all have hand steering and direct reversible diesels, and a single hatch for shrimp under the after deck. Square sterned like seiners, they have a small cabin-pilot house, with outdoor pilot house, with no shelter, to permit watching out for good fishing grounds while running. Four have 100-hp. Lorimer diesels; 5 have 85-hp. Atlas diesels; one has a 90-hp. Washington; one a 90-hp. Enterprise; one a 90-hp. Atlas and one a 165-hp. General Motors with gear drive. The last three have 125-hp. Murphy diesels.

Most everybody's small diesel is represented! The big construction project for 1951 is well under way. Ironically, despite the fact that National is a steel shipyard, the two biggest ships under way are giant wood and diesel vessels with Douglas fir brought down all the way from British Columbia! These ships are each 137 feet long by 33 foot beam and carry 330 tons of fish. They will be ready in April and July of 1951 respectively. Both pack an 850-hp. supercharged Enterprise with reduction gear, and two 150-kw. Murphy auxiliary diesel sets for operating the large refrigeration load. Both are built for M. O. Medina and Associates, the leading San Diego tuna pioneer.

Two other tuna clippers are under way, a 121x27 footer packing 250 tons of frozen fish for French Sardine Company. This vessel will carry a DMG36, 600-hp. Enterprise and a 90-kw. Murphy auxiliary set. The other steel ship is 127x30 feet and packs 300 tons of frozen fish, and carries a DMG 38, 800 hp. Enterprise and a 115 kw. a.c. auxiliary generating plant. She is for the Castagnola family of San Diego, likewise pioneers in the business. Obviously, National's building four of the largest clippers gives it front rank in the 1951 building program on the Gulf and West Coast.

Exchange Your Diesel Maintenance Ideas

CONDUCTED BY R. L. GREGORY

MORE ON MAINTENANCE PROBLEMS

Under this section in the last issue of DIESEL PROGRESS, the writer was discussing various maintenance problems and particularly the problem of bearing failures, of which there has been a more than usual number of cases in the past few months. Going further into this question we meet other factors which may have some bearing on the problem, especially the lack of proper cleaning at the time of manufacture and assembly in the field. This has been a problem with the manufacturers we know, in getting the personnel on the assembly floor to clean all parts properly, especially the crankcase. A frames, and the places in the engine where foreign matter might accumulate and remain until flushed out by the lubricants. As an example I can recall one unit which I saw recently. From the appearance of the crankcase it had been washed down and thoroughly wiped out, but in looking around I noted that in out-of-the way crevices, behind some of the nuts, on the upper ledges of the A frame and in various places hard to get at, there were accumulations of steel shavings and cuttings, steel slivers, grindings and in a couple of places even burnt matches which some careless workman had thrown down in a thoughtless moment during erection.

Had the crankcase been filled to normal level with lubricant, preparatory to starting up, undoubtedly not a great deal of this foreign matter could have been noticed immediately. But after a few weeks of operation the circulating lubricant would have eventually flushed this material out of these hidden places and they would have eventually discovered them in the crank case oil and collecting on the filter bags of the continuous type of lube oil filter which was installed on the unit. With the ordinary type of filter some of this foreign matter will be picked up but not in its entirety. Some of the particles would be too heavy to pass through in the oil stream, others would work their way into the clearances between the shaft and bearing shells, and thus lay the foundation for eventual bearing trouble.

If you have ever taken out a bearing shell and inspected it under a microscope, you will note pieces of foreign material imbedded in the babbitt, particles that are not discernible to the naked eye. These particles certainly are not in the clean lubricant when it is put in the engine and about the only conceivable place that they could originate is either having been left in the unit at the time of assembly, or grindings and small slivers which have not been carefully watched during the process of maintenance. Now in some instances these would not accumulate to the point of doing damage. They would become imbedded in the babbitt shell and if enough lubricant were present no scratching or gouging would appear. This would depend upon the nature of the foreign material as well as the size. If it were hard chunks of carbon or some softer material nothing might come of it. However, I have seen bearing shells with some sharp pieces of steel shavings imbedded in the babbitt shells and where these came in contact with the shaft, there would be a slight scoring. When this is allowed to go on unattended you can eventually expect bearing troubles. Now the question is, how are you going to prevent cases of this kind. First, an exceptional amount of care should be exercised by the mechanics in assembly of the unit, whether in the shop or in the field erection. Every part should be properly cleaned. Often in erection a mechanic finds he has to drill or tap additional bolt holes, possibly overlooked in assembly or for addition of other equipment in the field. When such a situation arises it is imperative that the chips and shavings resulting from such operation should be salvaged and not allowed to drop promiscuously into the crank case or other parts of the unit. This naturally takes some precautions on the part of the mechanic, but it is good insurance against trouble.

In most plants a time comes when the shoulders at top piston stroke must be ground off. Here again care must be exercised not to allow these abrasive grindings to get down into the lubricant. Another matter is that of carbon residue when cleaning ports. Carbon is to a certain extent abrasive, so when the ports are cleaned, suitable protective covering should be placed over the connecting rods, bearings, crosshead guides and crankcase openings. One of the large diesel manufacturers has been working on and developed a "magnetic filter." This filter is placed in the lube oil between the crank case and the regular lube oil purifier. The writer recently witnessed the results of such a filter and it was surprising the amount of foreign material that was picked up by this type of filter. Since it was magnetic it took out particles of steel, small shavings and other foreign matter which a cartridge type filter would not touch or which would work through these filters eventually.

Another matter of importance is proper lubrication and attention to the condition of lubricants. Too much cannot be said on this subject. We here in our plant, recently experienced a situation which might have resulted disastrously had the operators not been on their toes. We use a certain type of lubricant and have done so for years. A few weeks ago we ordered several barrels of this lubricant, of the same specifications and viscosity as we had been using. The new shipment arrived but upon using it we noticed that it did not appear to react the same as previous shipments. Upon investigation we found that previous shipments had come from one company refinery and that this questionable shipment had been shipped in from a refinery far distant from that supplying the original oil. While both oils were supposed to be made to the same specifications, there proved to be a vast difference in them and we immediately ceased using the questionable shipment and secured some of our old lubricant. Vigilance of operation paid off in this case and averted a situation which could have resulted in difficulties.

There are certain companies today marketing oil testing equipment, which will give you almost instantaneously the condition of your lubricants.

Last but not least is the matter of vigilance and pride in the care of equipment which must be taken; not only of your units but of plant conditions. For instance, we have so often stated in these articles, preventive maintenance is so much cheaper than maintenance forced upon you. Some time ago the writer visited a certain diesel plant and found maintenance men recharging a lube oil purifier. This purifier had not been properly maintained and when the cartridges or canvas bags holding the filtering agent were removed, it was found that they had been in the filter so long that the canvas had deteriorated, allowing the filtering agent to get into the oil of the crankcase. This was a matter of sheer negligence, and instead of merely by-pasing the filter and changing the bags of filtering agent, which at most would have taken but an hour or two, the maintenance force had to clean out the purifier, drain the oil from the crankcase, clean out the crankcase, install new oil and then recharge the filter and start from scratch. The whole operation took over a day's outage to say nothing of the extra man-hours of labor. All this could have been averted by periodical maintenance and inspection.

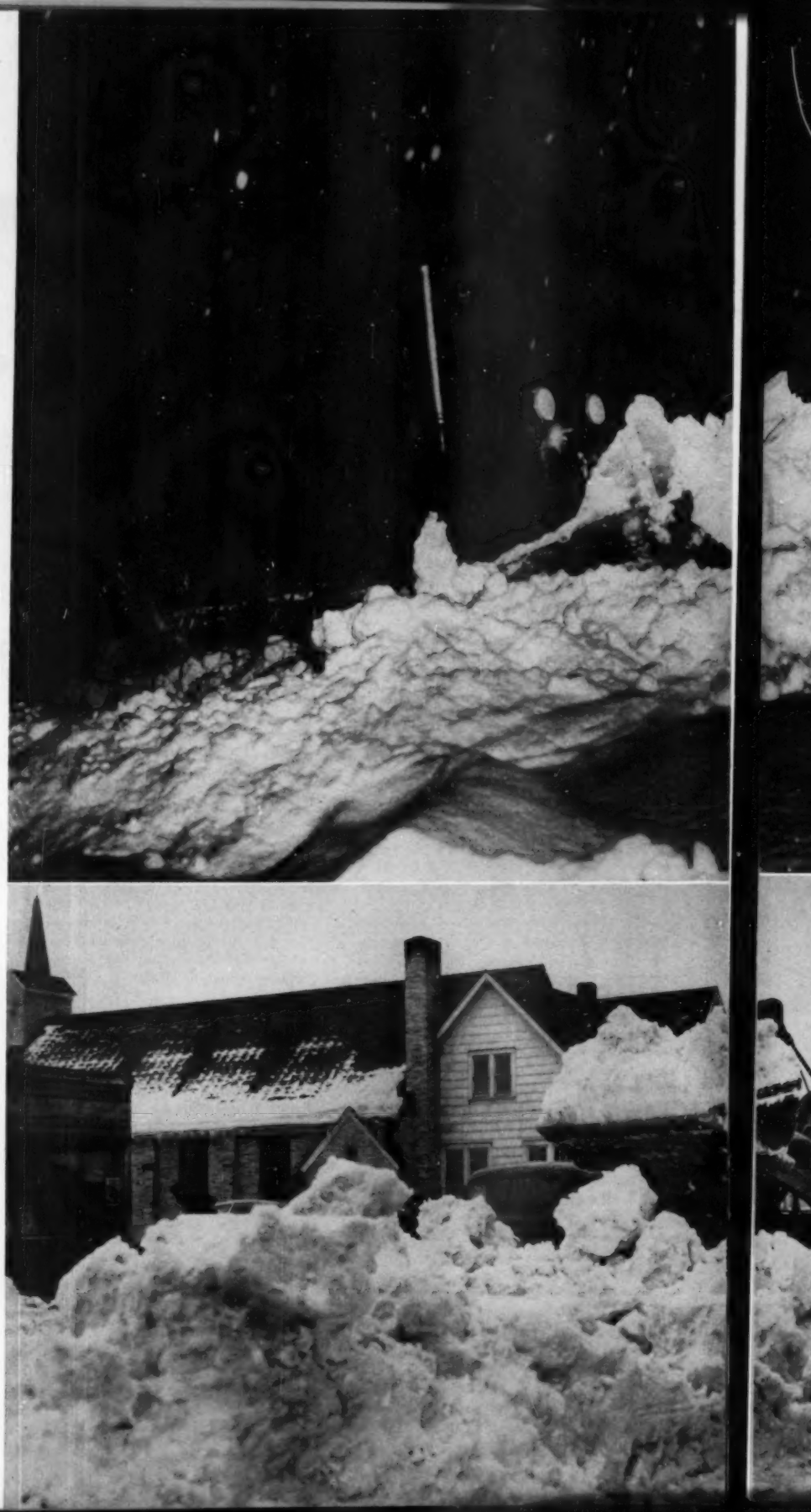
DIESELS BEAT SNOW

By W. L. BODE

WHEN Old Man Winter takes off his kid gloves, dons brass knuckles and starts swinging in earnest, the result is often staggering to a modern world geared for speedy transportation and smooth communication lines that keep life moving at a consistent pitch. When a series of January storms lashed out at the nation's great Northwest this year, big dieselized equipment was ready to tangle with the elements at every turn to prevent paralyzation of everyday community life, or to reduce the tremendous hazards by breaking complete tieups in a matter of hours. Here pictured are a variety of examples of how diesels rushed to the rescue.

Kellogg, Idaho, found itself deluged with a heavy, wet snow that reached depths of four feet on city streets and called on its Caterpillar diesel D4 tractor, equipped with a Trackson Traxcavator, to meet the challenge. This sturdy unit worked 16 hours a day, loading 60 yards of snow per hour into trucks which then carted the white menace off for disposal. Lincoln County, Washington, has 900 miles of road to keep open with its power equipment which includes three Caterpillar diesel graders, and an Adams rotary plow and grader. One of the chief weapons in Lincoln County's "Operation Snowplow" was a D12 motor grader which worked a 16-hour day during the emergency, covering 20 miles a day.

In the heart of the Coeur d'Alene mountains and big Idaho mining districts, a D4 tractor, equipped with a bulldozer, had an entirely different task. It was assigned, as part of its snow removal duties, to "dig out" a county hospital and home for aged people. The big institution had been marooned by snow piled three feet high. Kootenai County, Idaho, used a D6 tractor and Balderson V snow plow with wings to clear 88 miles of county highway. The beat was on high prairie land where the wind was strong and the snow deep and packed, yet this unit cleared from ten to fifteen miles per 24-hour day. The same county also threw two Caterpillar motor graders, a No. 12 and a No. 112, into the fight. The two machines, working together, cleared approximately 50 miles per day in a section where the snow lay 18 inches deep. And, to prove further the variety of jobs diesels are called upon to do, at Wallace, Idaho, a D7 tractor and angling bulldozer were used to clear snow from the Union Pacific Railroad right-of-way to keep the iron horses moving despite snow that piled up to depths of 62 inches.



Kellogg, Idaho. Caterpillar Diesel D4 Tractor with Trackson Traxcavator loads wet snow from city streets. Snow is 4 feet deep.

Shoshone County Idaho. Caterpillar Diesel D4 Tractor with No. 4A bull-dozer removing snow from roads at county hospital and home for aged people. Snow is 3 feet deep.

Lincoln County, Washington. Caterpillar Diesel No. 12 motor grader, equipped with snow plow, removes snow from county roads near Davenport, Washington. County has 900 miles of roads to keep open.

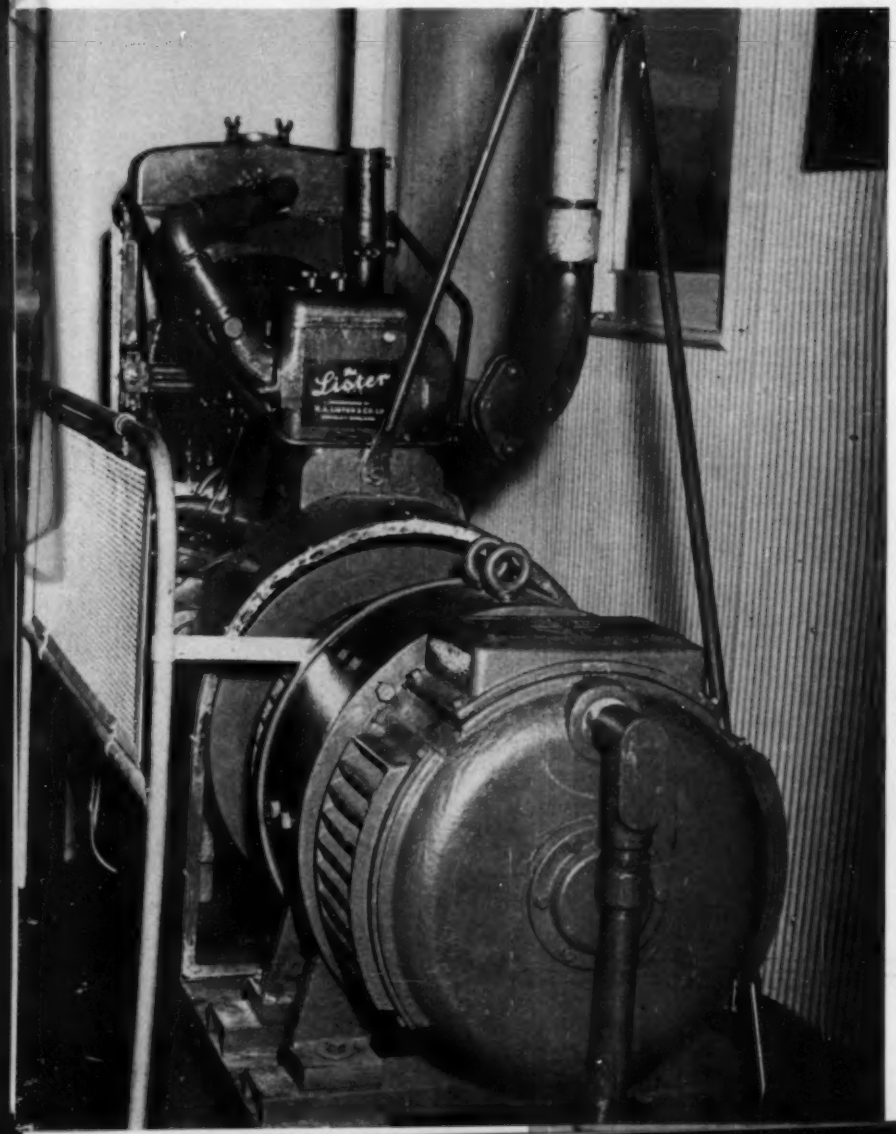
Kootenai County near Coeur d'Alene Idaho. Caterpillar Diesel No. 12 and No. 112 Motor Graders remove snow from county roads, clearing about 50 miles per day. Snow is 18 inches deep.

HEAT FOR DIESEL TRAINS

By HUGH G. JARMAN

IT SEEMS ironic indeed, that it should have been a Canadian railway company who first introduced the diesel-electric locomotive to the North American Continent, and this same locomotive, was to establish a speed record over a quarter-century ago, which still stands today unbeaten, when she ran from Montreal to Vancouver, a distance of 2,937 miles in 67 hours; present day huge transcontinental express trains take over 15 hours longer to make the trip. Yet, today, both Canadian railways lag far behind their United States compatriots in diesel electric transportation, held in check by the cold weather "bug." The greatest problem encountered by the Canadian railways in their determination to change their systems over from steam to diesel-electric locomotive power, has been that of satisfactory heating of their passenger trains during the intense cold of Canadian winters. Canadian winters have always been a thorn in the side of the railways for at a time when their steam locomotives are running at their lowest efficiency, they are called upon to give up still more of their steam supply in the necessary heating of their passenger car equipment. Even the discovery and increased production of Canadian oil wells did not influence the railways to turn to diesels, it took the combined shortage of coal during the coal strike plus the high cost of operation which finally set them to work instructing their engineering departments to try and find some way to adapt diesel-electric locomotives to cold Canadian operating conditions.

At first the Canadian National Railway System avoided this painful subject by simply using their powerful streamline diesel-electric locomotives for freight service. Here they ran into another snag . . . that of the necessity of holding several steam locomotives on call to handle passenger train service on many of their short runs, which were otherwise entirely dieselized. The passenger traffic certainly did not warrant the high cost of converting all of their diesel locomotives with heating equipment large enough to handle the trains, and neither did it warrant the purchasing of special diesel-electric passenger locomotives. They therefore instructed their engineering department to develop some system by which they could utilize any one of their high speed diesel-electric freight locomotives for hauling these passenger trains. The Canadian National Railway's engineers wen to work and developed their own special steam generating cars, which could be attached to the train as a unit part of the train, and therefore would be independent of the locomotive for heating purposes. Two years ago these same engineers had developed a special all steel high speed box car for service on their express boat trains traveling from Halifax to Montreal. The cars had heavy duty passenger car trucks equipped with ball bearing axles.



The 22-hp. Lister-Blackstone electric generating set which provides the power and lights for these special steam generating cars.

Using the same general plans as a basis upon which to start, they redesigned the body so that it has two regulation style passenger type side doors with glass windows, two center back doors which allow the trainmen to pass directly through the car while the train is in motion and four regulation size passenger car windows. The car is partitioned into

One of the new Canadian National Railway's steam generating cars for use in connection with the increasingly large fleet of Canadian diesel-electric locomotives used both on freight trains and passenger trains.

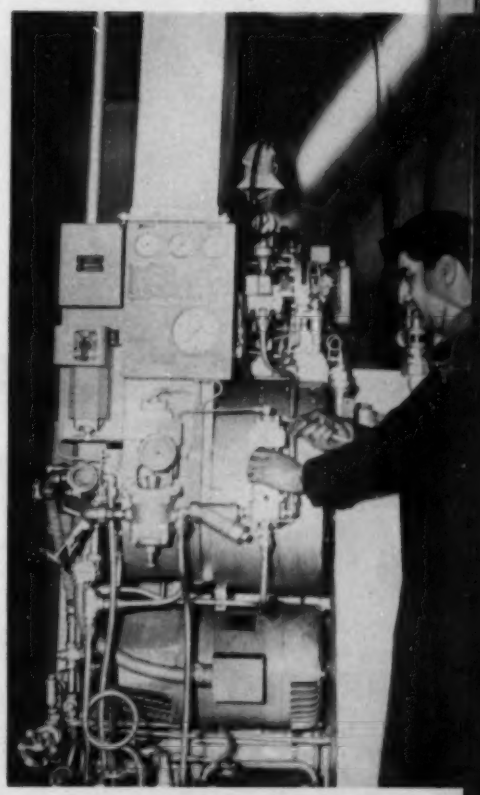
two sections, the front having two 1,100 imperial gallon capacity water tanks, one of which is used for boiler water supply and the other is at present used for condensation, but which would be used as additional water supply when the cars are to be used on 12 to 14 car trains. There are two 325 gallon fuel oil supply tanks, one for the regular supply of fuel, the other for emergency use if the train should be snow bound or otherwise unexpectedly delayed for a long period of time. In the equipment half of the car they have built in a large hatch in the roof, large enough to remove any one of the packaged units of the car which may require removal for overhauling. The car itself is entirely insulated against cold. The heating equipment in the car consists of one 3,000-pound Clarkson vapor steam generator unit, with provisions made for a twin installation when required for heavier service. The generator flue exhausts through the roof. The power to operate this self contained steam generator unit is provided by a two-cylinder 22-hp. Lister diesel 4-cycle engine, generator set; this engine exhausts also through the roof.

This diesel engine direct connected generator set also furnishes electric power to operate an air compressor, the electrodes and also the car lighting system. It also recharges a 24-volt exide starting battery which is wired up for emergency lighting when the generator set is not in operation. The air-compressor unit has a capacity of 16 cu. ft. of air per minute. Every piece of equipment was specially designed as separate package units which are instantly interchangeable and prevent the car layover for a longer period than that allotted for regular train servicing period. In planning the installation of each piece of equipment, it was laid out so that there was ample room to service it from all sides—a stainless steel safety rail and guard screen has been provided on the center aisle side of each unit. The exterior of the car is painted in standard Canadian National Railway passenger car green with gold lettering. The interior is aluminum finished with all units and face of switch boxes in bright red. The floor is black enamel.

These steam generating cars are entirely automatic in operation and require no attention from the time they leave the marshalling yards until their return under ordinary running conditions. The only manual operation is the separator blowdown which is done by remote control. The steam generator car is attached to the train at the time the train is made up in the marshalling yards. The generator is started when the train lineup has been completed. While the train is waiting in the station for its locomotive and departure time, it is not necessary to hook it up to the usual steam heating system. As soon as certain runs are entirely dieselized it will be possible by means of these cars to eliminate the large central steam heating plant, usually operated especially for train heating—thus effecting large and unexpected savings. Under scheduled operating conditions, the unit does not require any further attention until the train again returns to the marshalling yards, it being of sufficient capacity to operate for the round trip. If the train is regularly scheduled to lay over a full day or night, the unit is closed down and heat disconnected from the cars. It should be mentioned here that the heat in each car is thermostatically controlled, the heat by-passing the cars in which the control has been automatically closed.

The Canadian National Railways have given these cars the most severe tests and believe that they have solved their train heating problem, and have, at the same time, saved themselves hundreds of thousands of dollars because they have eliminated the necessity of equipping their entire diesel-electric locomotive fleet with passenger car heating equipment. The cars have eliminated stand-by power, the necessity of central heating stations and the need to hold certain locomotives exclusively for passenger train service. They have succeeded in heating their longest trains, having done this without the necessity of employing additional manpower. They are now able to hook up any diesel locomotive which may be available to haul their short run passenger trains. So far the steam generator cars are used only on runs of under 500 miles in length, whereas their regular 65 mph. fast freight diesel-electric locomotives are suitable to handle the passenger service.

One of the 3,000-pound Clarkson vapor steam generator sets used in these Canadian National Railway steam generating cars.



"COUNTESS" & "CAPE SAN VINCENT" LEAVE TACOMA FOR SAN DIEGO

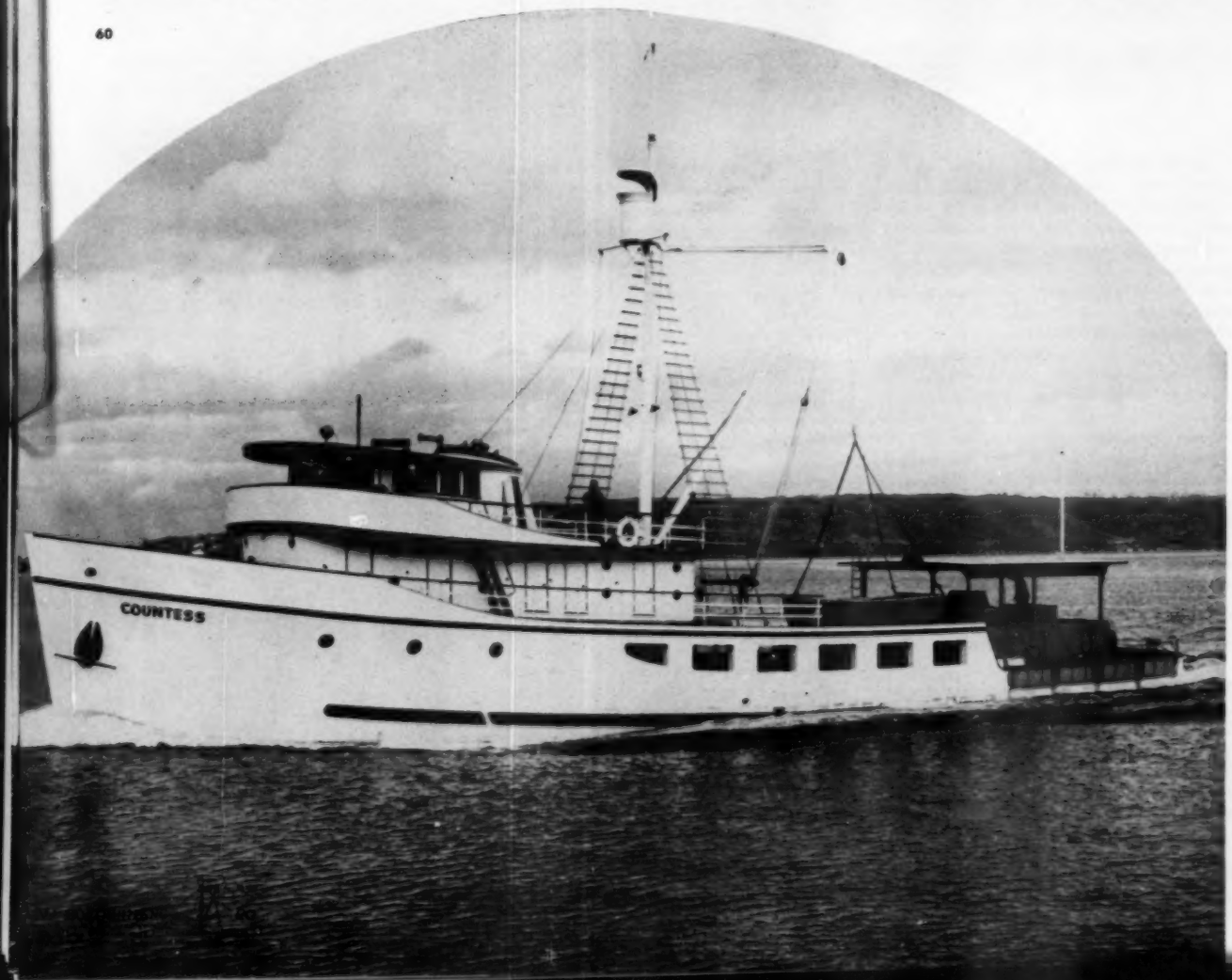
By CHARLES F. A. MANN

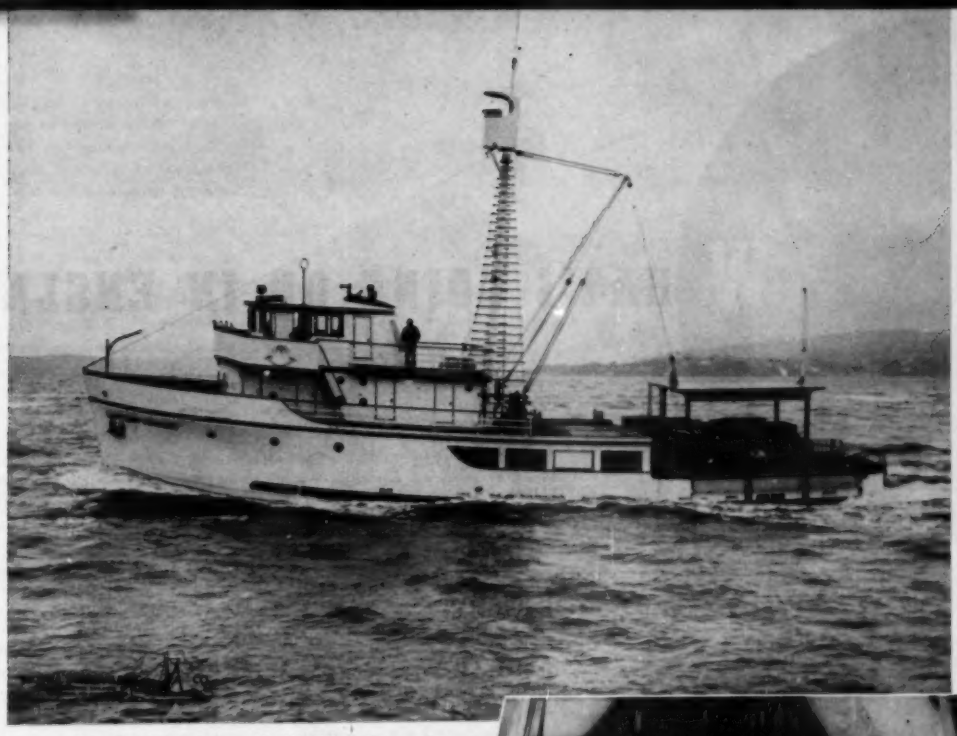
AFTER a long summer of doubt, Tuna clipper construction at Tacoma, home of many Pacific Coast built tuna clippers, suddenly turned two important clipper projects to a "Delivered & Gone" basis during the last week in November and they took off for San Diego, their home port for operation. *Countess,* big, trim clipper for Antonio Francisco and Associates of San Diego, and *Cape San Vincent,* slightly smaller clipper for Vincent Gann and Associates, also of San Diego, represent two of the best of the 1950 production. Designed by Arthur De Fever of San Pedro the *Cape San Vincent* is a nifty, husky wood diesel job with over-all dimensions of 91x24.1x12 ft. and powered with a 6-cylinder Enterprise Diesel, having 12x15 cylinders developing 400 hp. at 400 rpm. with full pilot house controls. She has quarters for a crew of 12, plus raised deck quarters for the captain and engineer and is modernly appointed as a hotel for living aboard. She packs two steel lined fish wells for use outbound as fuel tanks and inbound as refrigerated fish holds, plus six additional refrigerated fish holds and 3 refrigerated bait boxes on the main deck. Construction is of heavy Douglas fir with teak trim.

A pair of 6-71 6-cylinder General Motors diesels drive the 75-kw. auxiliary master generators, supplying 220-440 volt current for the usual elaborate auxiliary plant. Refrigeration is with 3 15-hp. Baker Quad compressors with Master motors, a 7½-hp. Devilbiss auxiliary air compresor and 7½-hp. Northern Anchor winch and Northern cargo hoist; 8 Jacuzzi 2-hp. brine pumps, a Jacuzzi bilge pump, and Universal salt and fresh sanitary water system are some of the added equipment. Two 10-foot Fairbanks-Morse turbine bait pumps, each driven by 15-hp. 1,750-rpm. motors (vertical), monel tailshaft and Doran propellers, not to overlook an elaborate layout of Cutler-Hammer motor controls and Tacoma Boatbuilding Company's own design of switchboard.

Countess, the larger of the two ships was designed by Tacoma Boatbuilding Company's own staff and has over-all dimensions of 120.6x27.4x14.1 feet, and packs 250 tons of frozen tuna in 12 steel-lined wells and 3 large deck boxes. She carries a crew of 15 in the main deckhouse and roomy captain's and engineers' quarters. The large pilot house, streamlined awning over the upper walkway in front of the pilot house, streamlined stack shelter built integral with it, and easy lines, make the *Countess* a distinctive clipper, as well as fast, considering the power installed. The main power plant is an 8-cylinder Washington diesel 14½-x18-inch cylinders, and developing a full 600 hp. at 227 rpm. Auxiliary power is supplied by two General Motors diesels driving 100-kw., 60-cycle, 220-volt a.c. generators.

Twin 7½-hp. DeVilbiss air compressors driven by 3-hp. Master motors; twin 25-hp. Fairbanks-Morse vertical bait pumps and twelve 3x2-inch Jacuzzi brine circulating pumps each powered by 3-hp. Master motors are the principal features of her

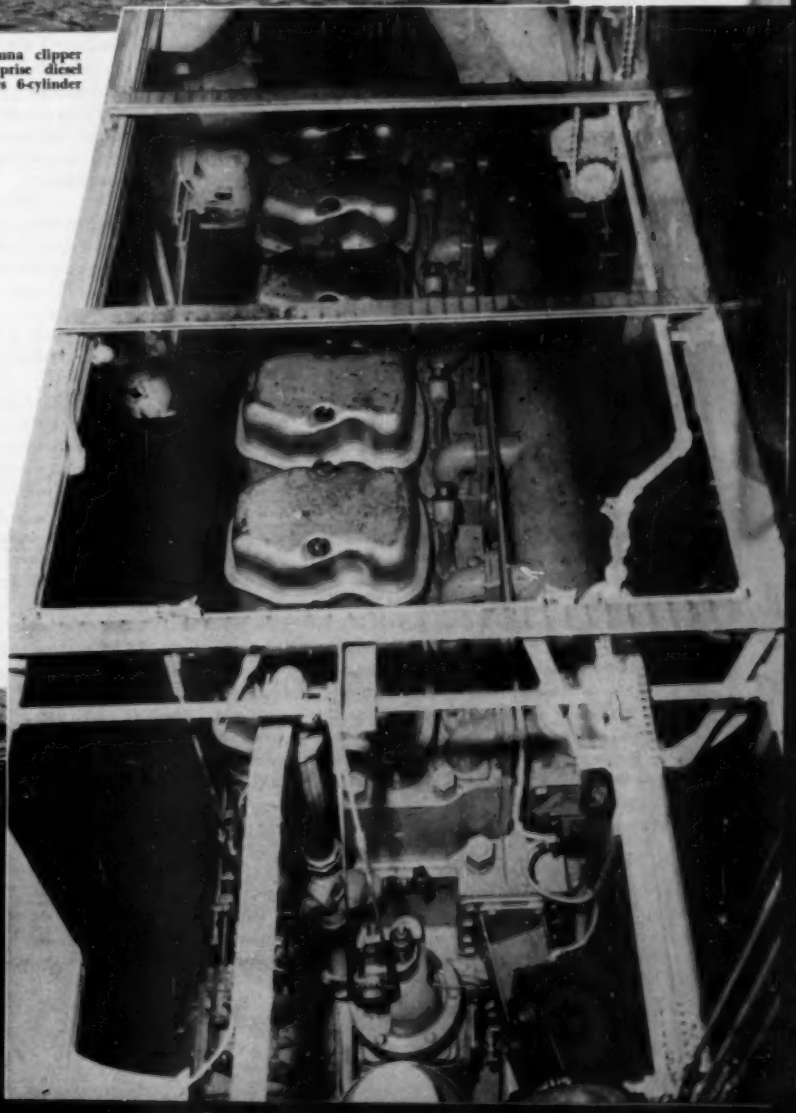




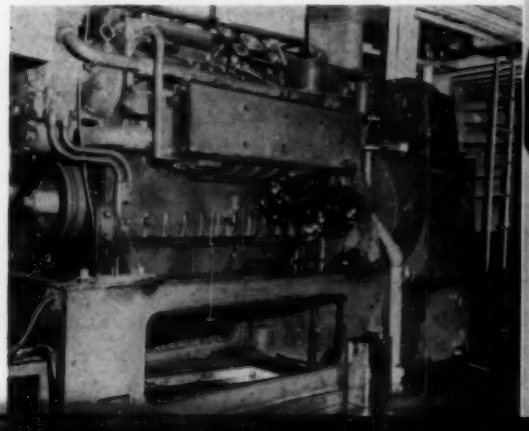
Cape San Vincent **is a 91x24.1x12-foot Tuna clipper powered with a 6-cylinder, 400-hp. Enterprise diesel engine and a pair of 6-61 General Motors 6-cylinder auxiliary diesels.**

elaborate pumping layout. Also there is a 7½-hp. Jacuzzi fire, a 5-hp. F.M. bilge and 5-hp. F.M. brine transfer pumps. She carries a heavy monel metal tailshaft with Goodrich bearing and Coolidge propeller. A 10-hp. Northern anchor winch is fitted, as well as a full Sperry electro-mechanical steering gear. Refrigeration is supplied by three sets of 5½x5½ Howe units driven by 20-hp. Master motors and a small 3x3 Howe unit for the large galley icebox. Currently the Big Push is on for next year's approximate fleet additions of 28 clippers, which may, if war conditions change, have to be rushed through ahead of the normal season to make way for possible Navy contracts.

Looking down on the main 400-hp. Enterprise diesel engine installed in Tuna clipper *Cape San Vincent*.



The *Countess* is powered with an 8-cylinder, 600-hp. Washington diesel and a pair of 100-kw. General Motors Detroit diesel auxiliary generating sets.



WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

Hamish Ferguson was appointed Secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr Ferguson continues to do independent consulting work.

DIESEL-HYDRAULIC PROPULSION ("HYDROPULSION")

A PRACTICAL application of a new transmission system for marine propulsion. Among the many forms of marine propulsion which have been tried out in conjunction with diesels there are, in addition to the direct-coupled reversible unit, the oil-operated reverse reduction gear box permitting one-way rotation of the engine and, also, the diesel-electric system which not only has one-way rotation but can be arranged for constant engine speed. Each system has proved itself satisfactory for certain applications and has come to stay. Doubtless the development and increased use of the gas turbine for ship propulsion will become evident during the next few years, yet it is safe to predict that it will never be utilized for the most onerous of all marine duties, namely the propulsion of tubs operating in the confined waters of a comparatively small, though immensely busy river, such as London's River Thames.

The requirements of a Thames tub are that it must be capable of being underway in the minimum of time. When towing barges against the tide full power will be required continuously, perhaps for several hours, and when maneuvering it may be necessary to reverse from full-speed ahead to full-speed astern as often as 30 times per hour. In addition, there will be considerable periods of idle and light-load running for the engines to undertake. Viewed in this light the mainline diesel-electric locomotive has a dead-easy time of it and even the shunting locomotive is comparatively well-treated. Then finally, in addition to the requirements outlined, 100 per cent reliability is essential, for if the tug fails untold damage may be caused to other vessels and craft operating in a narrow and often congested river where many bridges have to be negotiated. When building their latest tug *Tom Jay*, the Thames Steam and Lighterage Co., Ltd., of Brantford, London, had all these points well in mind.

They had already pioneered the first cold-starting direct-reversing diesel engine to appear on the Thames in 1929 and had followed this with diesel-electric tugs as well as another incorporating the oil-operated reverse-reduction gear box. All of these proved successful in their individual ways. When a new propulsion system was brought to the Company's notice their marine superintendent F. J. Mayor saw in it great possibilities for his particular type of work, the most important feature being the reasonable certainty of full security of the vessel should any engine failure occur. Full power in a medium-sized tug could be developed by three out of the four engines installed and each engine could operate entirely independently from the others. Even operating on one engine alone, steerage way could be maintained.

The new system was the "Hydropulsion" system developed by Commercial Patents, Ltd., of London. In broad outline the principle involves the use of a group of engines, each direct-coupled to a radial pump supplying oil at a high pressure to a single hydraulic motor which in turn transmits the power to the propeller shaft.

The tug *Tom Jay* was designed to operate on this new principle and was built by Richards Ironworks, Lowestoft. The hull has a length of 77 feet overall, a breadth of 18 feet, and a depth of 9 feet, 5 inches. Shaft speed at full power is 110 rpm., and with the large diameter propeller used this may be considered typical of the size requirements for a medium-sized river tug. The system consists of four power units, three of which are normally in service the other being reserved for stand-by. Each power unit consists of a 6-cylinder Gardner L.5 diesel, of 100 bhp. at 800 rpm. direct coupled to a 7-cylinder radial oil pump designed by G. F. Jones of Commercial Patents, London. Eversheds and Vignolles built the hydraulic propulsion motor. Oil is drawn from a service tank and after passing through a strainer it enters the suction main to the pumps. From the pumps it is delivered to the service main at a maximum pressure of approximately 2,000 psi. As the load decreases so also does the oil pressure. The oil passes from the main to a pressure retaining valve and thence to the control combination. The function of the pressure retaining valve is to retain sufficient pressure, when the pumps are running under no load conditions, to operate the reversing valve. The control combination is connected to the propulsion motor by two pipes, one of which conveys the oil under pressure to the motor and the other the exhaust from the motor. The direction of flow is regulated by the reversing valve for "ahead" or "astern" running. The control valve combination is operated by a relay mechanism and is connected by shafting with universal couplings to the master control on the bridge. All the slave controls are below deck, operation being by oil pressure supplied from an auxiliary pressure pump. A further valve is incorporated in the control valve combination and this controls the lower speeds of the motor by permitting a portion of the high-pressure oil to be by-passed to the service tank.

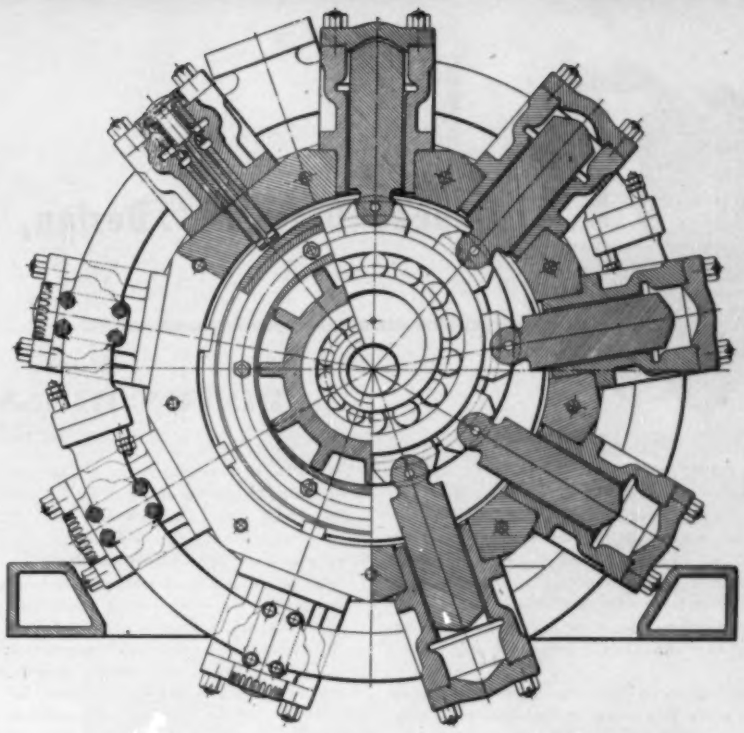
Speed control is effected by movement of the engine fuel pumps which are operated by Eversheds Powerotor units which insure synchronization of all the engines in operation. Maximum and minimum engine speeds are 800 and 250 rpm. respectively. When the vessel is changing from full speed to stop, the first part of the speed reduction is obtained by reducing engine speed to 250 rpm. The motor speed being reduced proportionately.

Following this, the by-pass valve is gradually opened until all the oil is by-passed to the service tank and the motor then stops. The propulsion motor is designed to develop its maximum power of 260 shp. when running at 110 rpm. with an oil pressure of 2,000 psi. The axes of the cylinders are in the plane which meet at the center of the crankshaft and the whole structure is built around a forged steel foundation ring. Each cylinder is provided with two poppet valves, one giving access to the cylinder for the high pressure oil and the other to release the exhaust. The oil has access to the valves by way of branches fitted to the valve chambers. The valves are operated by eccentrics attached to the crankshaft through the medium of tappets. The hydraulic pumps are of the 7-cylinder radial type and in design are almost identical with the propulsion motor with the exception that the inlet and outlet valves are automatically operated by the pressures in the cylinders rather than by positive mechanical means.

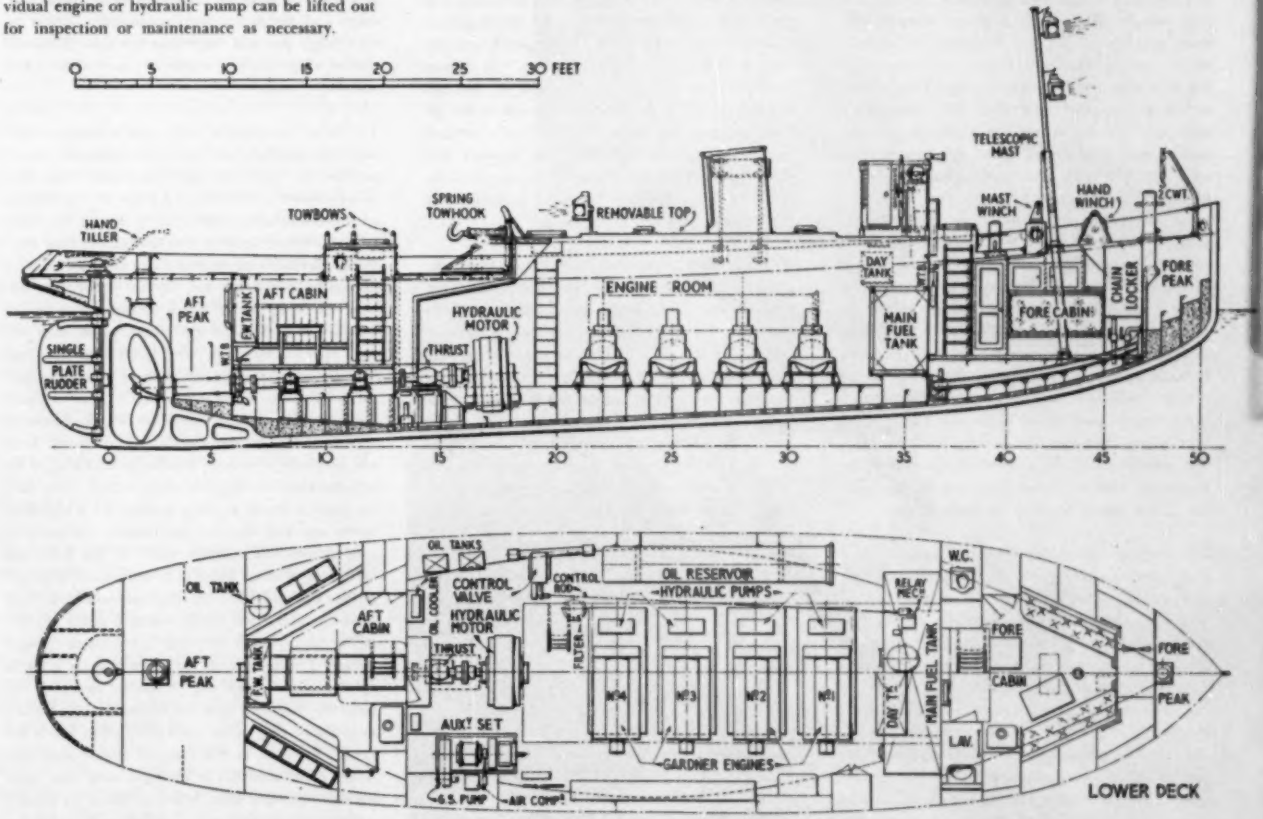
In view of the design of the propulsion motor it is essential that end movement of the propeller shaft should be restricted within closely defined limits. To secure this, a Skefko spherical roller bearing has been used with satisfactory results.

The normal diesel-electric tug will have one, or at the most two power units. In the latter case, in the event of failure of one engine, the vessel will be controllable on the remaining unit. With "Hydropulsion," however, three engines could be out of commission and the vessel could still keep out of trouble in most circumstances. The writer was invited to inspect the vessel and to make a trip under normal service conditions. It seemed that the opinion of the skipper, who had handled the tug since it was first put to work, would be as good an indication as one could get regarding the success or otherwise of the experiment. The skipper stated that for his type of work the rapid response to telegraph orders and the ease of maneuvering were fully comparable with any other type of transmission he had handled and that includes them all. His only complaint was that the tug seldom missed a tide so that he had no extra time off on the plea of re-fitting.

Tom Jay has now been in continuous service for 18 months and the teething troubles have caused no loss of availability. The vessel is so designed that the engine-room cover can be lifted off bodily by a light-duty crane at the dockside and any individual engine or hydraulic pump can be lifted out for inspection or maintenance as necessary.



Sectional View, showing general arrangement of Hydraulic Motor.



General arrangement of the "Tom Jay"

High-Speed Diesels . . . Design, Operation & Maintenance

CONDUCTED BY H. G. SMITH

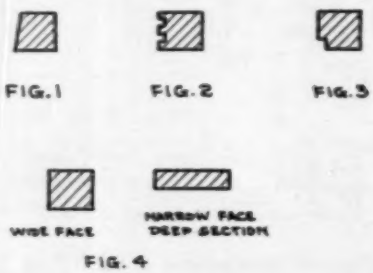
PISTON RINGS

IF THE Piston rings in your engines could talk they would tell you quite a story. First they would tell you what a beating they take, also they would probably be quite anxious to tell why they can and do take it. There is a big story back of the development of the rings we now have which would fill many volumes. However, this article will only touch on some of the more interesting points that have affected their design and selection.

The high speed diesel engine manufacturers and the piston ring makers realized quite early in the engine development that the rings used in other fuel engines were unsuitable and modifications had to be made. The fuel itself was one of the big problems because of the high sulphur contents. This extra sulphur caused the formation of a more serious carbon formation around the rings resulting in a more frequent case of ring sticking. Some of the changes that were made are mentioned a little later in this article but it should be mentioned that ring design alone did not entirely solve the problem. The lubricating oil people helped by introducing the heavy duty oils which break down this carbon and make it possible for it to be washed away. The major function of a compression ring is sealing the pressure in the combustion chamber but that is only one of its many duties. It must prevent the fire of the explosion from traveling down around the piston. It must stop any downward flow of unburned fuel. It must scrape off any carbon deposited on the cylinder walls that accumulate when the piston is in its bottom position of the stroke. Lately it has been determined that rust is formed at the top of the cylinder caused by a chemical action from the explosion. The ring must scrape this off each time the piston comes up after the firing stroke.

The rings operate under conditions quite different than other moving parts. To prevent wear they need oil like other parts but if they are provided with too much oil they can't handle it and up goes the oil consumption of the engine, too little oil, and rapid wear will occur. Obtaining this proper balance of just the right amount of oil, good sealing and doing all the other things mentioned above has been a challenge faced by the piston ring specialists. The rings that we have today are quite interesting in comparison with the earlier ones which were practically nothing but plain cast iron. Today the rings are made of special cast alloy iron much harder and stronger and some are made of steel. To give better wearing quality and self lubrication they are coated with various materials such as tin, copper and chromium and some are given various bath treatments which leave a coating that holds an initial film of oil, all of which helps prevent wear and scuffing. Sizes have been standardized but constructional details have not. Some compression rings have tapered faces like Fig. 1, others have one or more grooves as Fig. 2, and notches on the edge like Fig. 3 serve their purpose. These variations come about, not because of the ring itself, but the conditions surrounding the ring installation. Such things as cylinder material, smoothness of the cylinder wall, water circulation, temperature of the ring, its location in the piston, the design and material of the piston, all influence the ring design. The tapered face ring Fig. 1 is used to provide faster seating. The grooves in Fig. 2 provide channels to hold oil and the notched type Fig. 3 help to scrape off excess oil. Some engines may have all three types installed in the same piston and when this happens they should never be switched around because their location in the piston is very definite and for a particular object.

Diesel engines require rings which exert greater pressure against the cylinder wall than gasoline engines because of the higher compression and firing pressures. These higher pressures have a tendency of pushing the rings away from the cylinder wall and stronger rings are necessary. As the speed of the high speed diesel engine has increased, it has been necessary to actually make the rings lighter in weight. The old heavy rings would cause excessive wear of the grooves, this wear being due to a greater amount of inertia being stored up in the rings at these higher speeds. To meet these higher pressures stronger construction, more strength to push and lighter weight, the narrow faced deeper section alloy material ring as illustrated in Fig. 4 has been made. The design and construction of the oil control ring used today does not look much like those used in the earlier stages of development. Older rings looked more like a plain compression ring. The oil control was obtained by drilling a series of holes in an angular passage in the piston just below the oil ring. The oil control was not through the ring as it is today, the ring was only a dam. As speeds were increased and better oil consumption was demanded, the ring itself was called upon to accurately meter the oil going past them to lubricate the compression rings. The shape and design has been continually altered to do a better job and today they are now called oil control rings whereas originally, they were called oil scraper rings.



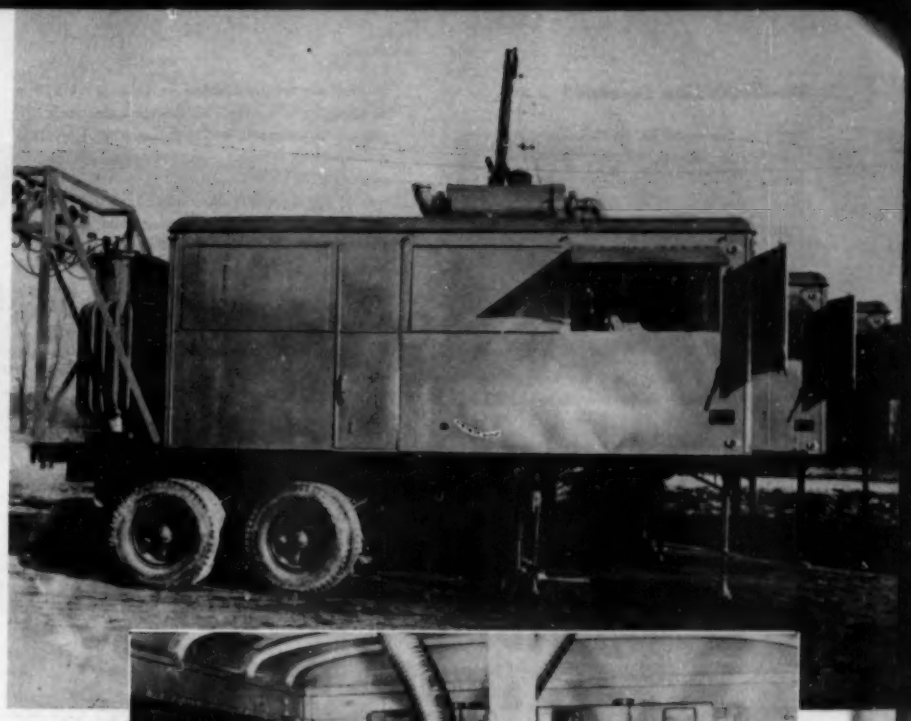
The writer continually avoids any mention of any particular patented or individual company's product but the new strip steel oil control ring now being offered to the trade is a piece of engineering and manufacturing that is worth special mention. It is mentioned because it is so different than anything previously made and has embodied in it a maximum of oil control. Several other new designs are being offered which means we can expect longer life and better oil consumption than we have had in the past. One point that has continually been brought out in these articles applies to piston rings much more than it does to other parts i.e., always use rings that are approved or recommended by the engine manufacturer. It is not generally known by mechanics and engine rebuilders that two rings looking exactly alike may be quite different in their action. Ring manufacturers can and do vary the tension (pressure of ring against the cylinder wall) of the same size and form of rings by several pounds without materially changing the ring dimensions. This is done to meet the various engine manufacturers requirements and cannot be detected without proper gauges. This change in tension will cause a lot of trouble and for this one reason be sure that the rings that are used have the engine manufacturer's approval. Using an oil control ring that is not the same type used in the original engine may give better oil control but at the same time may cause excessive cylinder wear. Worn cylinders do require a different ring than new ones but avoid using any that are not approved by the engine builder.

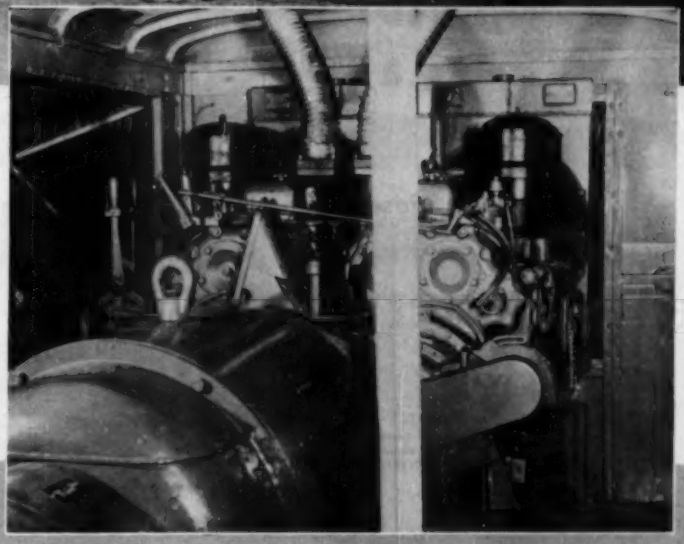
Diesels Help Hydro-Power

AMERICANS who have vacationed in Canada through the years will be interested in the gigantic task undertaken by the Hydro Electric Power Commission of Ontario which will convert Southwestern Ontario's 25-cycle electric current to 60-cycle. When the job is completed, American visitors will no longer notice a difference in lights upon crossing the border. The 25-cycle flicker will be gone and residents and industries will enjoy all the obvious advantages of 60-cycle current. The conversion will simplify procurement of industrial machinery and home appliances, as most of this equipment is designed for the 60-cycle current to be installed. It will also permit an interchange of power between the United States and Quebec in time of emergency without the use of costly, elaborate frequency changing equipment. It has been estimated that the project will require about 10 years to complete and will involve modifications to every substation in Southwestern Ontario as well as the conversion of most electric motors in use. "C" days are now being scheduled in the communities to be changed over. On these days the old power will be shut off while the Commission converts to the new current.

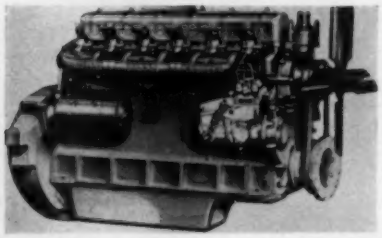
This does not mean, however, that life will come to a standstill. Portable diesel-electric generators provided by the Commission will be moved in, hooked up to the system and business will go on pretty much as usual. The first generator units to go into this service were developed for Ontario Hydro Electric Power Commission by W. C. Becker Equipment Company, Ltd., General Motors diesel engine distributor in Toronto. As similar units enter the service, the project will gain momentum to hasten the day all Ontario will be on 60-cycle current. Each of the five standby generators now in service consists of a Canadian General Electric 200-kw., 80 per cent p.f., 3-phase, 600-volt generator with direct-connected exciter at 1,200 rpm. coupled by Link-Belt roller chain type flexible coupling to a General Motors 2-cycle diesel engine. The engine is equipped with 1.33:1 reduction gears and governed for 1,600 rpm. engine speed. Diesel engine, generator and a 250 Imperial gallon fuel tank are all mounted on a combination steel base.

The switch gear panel is of steel, shock mounted, and contains three demand ammeters, test links, voltmeter and switch, demand hour meter, synchrostat and switch, synchronizing lamps, air circuit breaker, field rheostat and voltage regulator. Transformer primary terminals are connected to the 600-volt, 3-phase circuits leading from the back of the switch gear panel. An interlocking switch, mounted on the transformer cover, can be set for a range of secondary voltages at 2,300—4,000—4,600 or 8,000. A demountable steel frame supports the final hook type switches and lightning arrestors. The generators are trailer-mounted to assure easy movement from town to town.





Waukesha Line Expanded



The Waukesha Motor Company of Waukesha, Wisconsin introduced its latest addition to its line of diesels at the New York Transport Vehicle Show in Madison Square Garden on February 1st. The new engine is a 4¼x5 six of 425 cubic inch displacement and rated at 135 hp. at 2,800 rpm. It is a compact six-cylinder overhead valve engine. The crankcase is an alloy casting with heavy outside ribs at the base to insure maximum stiffness and maintain alignment of all moving parts. Internally, the seven bearing bridges tied into the side walls with large-radius fillets, and thick upper and lower decks make the structure distortion-free and provide solid support for the renewable dry type cylinder sleeves. Other features include Stellite faced valves and Stellite seats, hardened (300-350 Brinell) renewable cylinder sleeves, and American-Bosch injection system with single orifice pintle nozzles and single plunger injection pump.

No ONE Accessory Pays DIVIDENDS So Regularly as a GOOD OIL FILTER

Important Diesel engine builders and big scale users of engines reduce oil consumption, cost, and maintenance through use of MICHIANA Filters

Pair of 17400 Filters on common base casting. Each 50 H.P. capacity —combined, 100 H.P.

Lubrication is improved, fewer oil changes required, engine parts kept clean and bearing wear reduced. All this adds up to better engine performance, greater overall efficiency, fewer overhaul jobs, and dollar-and-cents economy.

MICHIANA Filters are made in a wide range of capacities — to meet small and large engine requirements. Bulletin 45-D mailed on request.

MICHIANA PRODUCTS CORPORATION, Michigan City, Indiana.

Above: 163 H.P. Filter Model 17050 in which one standard Element is used.

Left: 653 H.P. Filter Model 19800 using four standard Elements. Other sizes of Filters up to 3266 H.P. using same Elements.

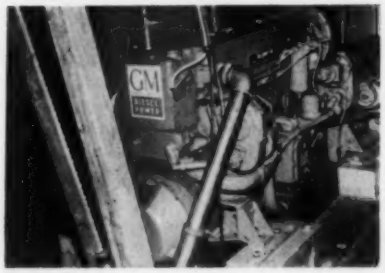
MICHIANA OIL FILTERS For Diesel Engines

Purolator Promotions

Two promotions in Equipment Sales personnel are announced by Purolator Products, Inc., Rahway, N. J., manufacturers of automotive oil filters and other filtration equipment. Frederick P. Babcock, formerly a sales engineer, has been appointed assistant sales manager in charge of aviation, government and export equipment sales. S. B. Wanner, of the Chicago sales office, has been appointed assistant sales manager for all other equipment sales. Mr. Babcock joined Purolator in 1937 after technical work with the Stanavo division of Standard Oil of New Jersey at Bayonne, Bayway and Jersey City, and sales managership of the New Brunswick, N. J., bulk plant. He graduated from the University of Michigan in 1930 as an aeronautical engineer, after obtaining a private pilot's license as an under-graduate. He is a member of Theta Xi fraternity. Mr. Wanner came to Purolator in 1934 as an inspector, and then went to Engineering as a draftsman. He became a sales engineer in 1935, and has been with the Chicago sales office since 1948.

Florida Shrimp Trawler

One of the first shrimp trawlers in Florida waters to be powered by General Motors' new "6-110" diesel engine is the *Big Lady* owned and operated by Land and Williams of Fernandino. The boat has an overall length of 60 feet, a beam of 18 feet and a draft of 6 feet. She is of wood construction.



The GM "6-110" diesel is rated at 275 hp. and drives a 42-inch by 32-inch 4-blade propeller through 3:1 reduction gears. A chain drive from the front power take-off operates the boom winch. The boat was recently completed by Diesel Engine Sales Company, Inc., of St. Augustine.

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● The result of Auto-Lite's 40 years of automotive electrical experience, Auto-Lite Diesel systems are complete from generator to voltage control to battery to starter. The dependability of Auto-Lite electrical units in service has made Auto-Lite the world's largest independent manufacturer of automotive electrical equipment. Engineers and executives are invited to consult with us on Diesel cranking and generating equipment.

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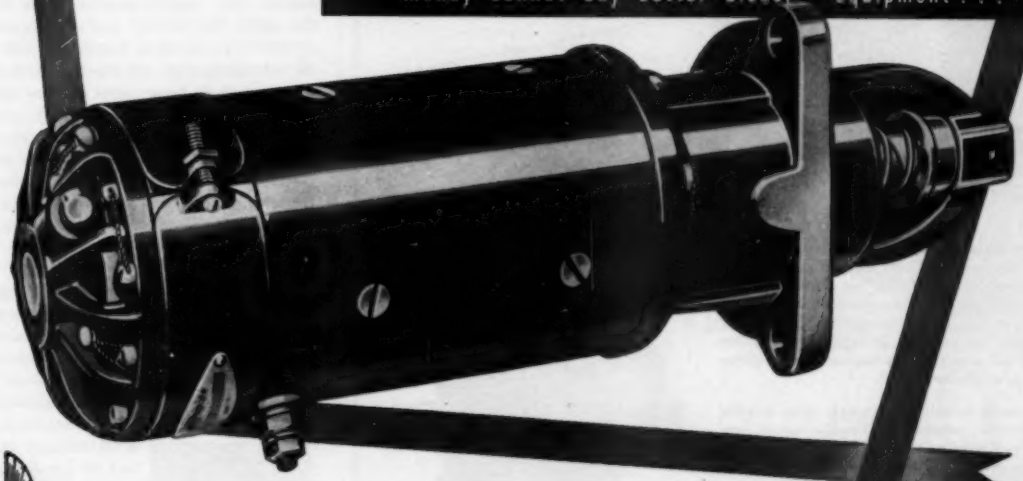
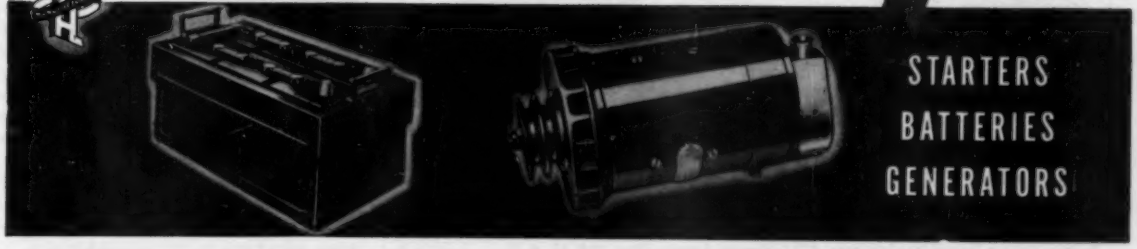
Money cannot buy better diesel equipment . . .



Tune in "Suspense!"—CBS Radio Network
Thursdays—CBS Television Tuesdays

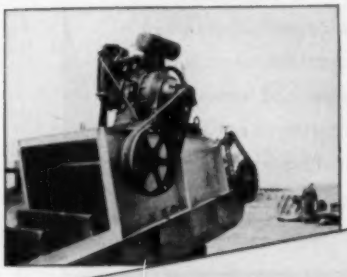


STARTERS
BATTERIES
GENERATORS

Diesel Installed in Standard Auto

Left to right: Norbert Kalplanski, Norman Esbrook and Jack Shafer of the Diesel Division, Utilities Engineering Institute, looking at the Hercules diesel installed in their Lincoln-Zephyr coupe.

To test the practicality and operating economy of dieselized autos, a Hercules diesel engine was recently installed in a 1940 Lincoln-Zephyr coupe. The installation, a class project for students at Utilities Engineering Institute, Chicago, was under the supervision of Norman Esbrook, head of the diesel division of the school. A Hercules Model DOOB 4-cylinder, 4-stroke-cycle diesel equipped with a Bosch injection system was used. The engine is a full diesel requiring no electric ignition for either starting or running. It has a 3¾-inch bore and a 4½-inch stroke, and will develop 60 brake horsepower at 2600 rpm. Originally designed as a Ford truck replacement, only a minimum of mechanical alterations were necessary. Special vibration dampeners to reduce the vibration of the 4-cylinder engine and a truck type clutch plate to offset the effects of the higher torque were installed. The diesel takes up only about half the space of 12-cylinder gasoline engine and weighs about 25 the original 12-cylinder gasoline engine and weighs about 25 pounds more. In a test run, the car averaged 35 miles per gallon of fuel. It was driven from Chicago to New York on $3.24 worth of fuel oil. The trip was made without any mechanical difficulty and speeds well over 80 mph. were attained. The economical operation and long life of the dieselized car are offset at present by the initial high cost of the engine, in this case about $1200.00, four times the cost of a gasoline engine.



POWER FOR A POTASH EMPIRE!

Big Savings At Bonneville Flats

ON THE famed and far-flung Bonneville Salt Flats of Utah, remote from power sources, eight husky LISTER-BLACKSTONE Diesels are replacing, out-performing, out-wearing and out-economizing gasoline engines formerly used by Bonneville, Ltd., in their giant potash-producing operations. Selected to fill "must" requirements in ruggedness, reliability and economy, they are slasing annual fuel costs by *enough to pay for themselves in well under a year!*

Completely unattended, except for refueling, these movable Lister-Blackstones deliver ceaselessly—24 hours a day—in summer heat and at over 4,000-ft. altitude, distributing the salt brine amongst huge evaporating lakes from which the potash is produced.

Pick a tougher test for diesels if you can. Regardless of your requirements, Lister-Blackstone gives you

LONG-LIFE ECONOMY • LOWEST PRICES • BIGGEST DOLLAR VALUES • ASSURED DELIVERY • 3 TO 480 H.P.

Write us your requirements • ORDER NOW

Lister-Blackstone 20 H.P. model 18/2 of the type used at Bonneville.

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LISTER-BLACKSTONE, Inc.

Factory, Sales & Service Headquarters: 420 Lexington Avenue, New York 17, N. Y.

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Pickering Governor Bought By Champlain

Champlain Company, Inc., Bloomfield, N. J., has announced the acquisition of the Pickering Governor Company from the Hartford Empire Company, Hartford, Conn. Champlain officials stated that the Pickering line of governors will be complementary to the manufacture of Champlain's line of heavy machinery for the graphic arts industry and that the sale and further development of governor products will benefit through the new parent company's manufacturing and technical facilities. The Pickering Governor Company, founded in 1862 for the manufacture of Ball-Ranger Governors for use with steam, subsequently made a wide range of governors for all types of engines. The company was located in Portland, Connecticut and for the past year operated as a division of the Hartford Empire Company. Under the new management, manufacture, sale and service operations have been moved to the Champlain Company plant, 88 Llewellyn Avenue, Bloomfield, N. J., where all operations will be continued. A number of the key personnel of the Pickering Governor Company have been retained among them Mr. Charles B. Taylor, chief engineer, who is widely known throughout the industry.

Buys Mid-Continent Reserves

In what is believed to be one of the largest purchases of privately owned natural gas reserves, a group of western industrial and investment men has been formed by William R. Staats Co. of Los Angeles to organize a new corporation for the production and development of gas properties in the Mid-Continent. The new organization, to be known as the Hugoton Plains Gas and Oil Company, is comprised of three principal stockholders—J. Simon Fluor, William R. Staats Co., and Fred R. Tuerk. Mr. Fluor is executive vice-president of the Fluor Corporation, Ltd., Los Angeles, designers and constructors of plants for the oil, gas-gasoline, chemicals and power industries. Mr. Fluor will be president of the new company. Other officers are: Fred R. Tuerk, chairman of the board; Donald Royce, vice-president; G. Hamilton Beasley, treasurer; and Dewey F. Gruenhagen, secretary. Mr. Tuerk, a midwest industrialist, has long been active in industrial banking. Mr. Royce is president and Mr. Beasley and Mr. Gruenhagen are executives of Staats.

J. Simon Fluor

Fairbanks Morse Promotion

C. G. Gehringer

Fairbanks, Morse & Co., announced the appointment of C. G. Gehringer as manager of their branch house located in Louisville, Kentucky. Mr. Gehringer is a former resident of Cincinnati, Ohio and was graduated from the University of Cincinnati in Engineering. He joined the Fairbanks-Morse sales organization in 1936 and in 1988 was assigned as a field engineer attached to the company's Columbus, Ohio, office. He saw service during the war in the far east as a captain in the army. Upon his return, he worked as a field engineer and special representative with headquarters at Louisville.

Mobile GMC Diesel Schools

Four specially equipped GMC diesel trucks, fully fitted out with cut-away model engines and tools, are touring New England, the south, the west coast and central areas. Each of the trucks are manned by two instructors. Covering areas in which GMC Truck and Coach Division dealers are located, they expect to train 1,500 mechanics. General Motors has trained about 800 mechanics in the science of diesel engine construction, maintenance and repair at its school in Flint since 1938, and another 200 at its school in Oakland, California. The new mobile schools will train mechanics, 12 in a class, in condensed five-day courses.

John E. Johnson, general sales manager of the truck division of GMC, in outlining the training program, stated, "Diesels are coming into the truck business on a rapidly increasing scale as they did into the railroads in the late 30's. Diesels have four basic advantages over gasoline-powered trucks; they use low-priced fuel, have low maintenance costs, high efficiency of operation and give fast performance. Because the cost of transportation is a substantial part of the cost of all commodities, demand for them is booming." Mr. Johnson also reported that GMC production of diesel trucks as a percentage of total GMC production in the 19,000 pounds gross vehicle weight class had grown from 1 percent in 1946 to 24 percent in 1950.

Aids in Competitive Selling

Every diesel salesman should have as a part of his working kit a copy of the DIESEL ENGINE CATALOG because this book contains a detailed description of every diesel engine made and sold in these United States. No matter what competition you run into, you can turn to this book and find the answer. Ask yourself why 121 Fairbanks, Morse salesmen carry this book in their cars; why 22 General Motors field men use this book as standard equipment, so to speak; why 27 of Worthington's top diesel salesmen use this book most every day. If you haven't got your copy of DIESEL ENGINE CATALOG, Volume 15, send a check for $10.00 to DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46, California, and the book will be on its way the next day.

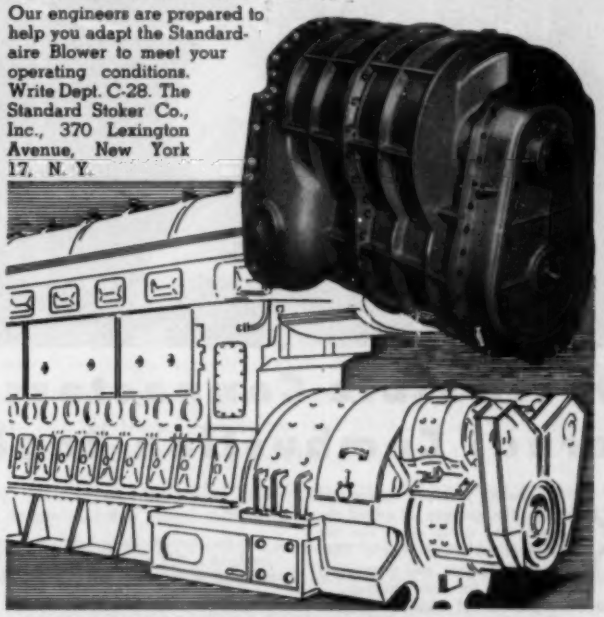
FOR INCREASED DIESEL OUTPUT

The STANDARDAIRE *Blower*

The Standardaire Blower with its unique features of design assures outstanding operating results whether for diesel service or for its many industrial applications. Service tested Standardaire Blowers have proved they operate with exceptionally high adiabatic and mechanical efficiencies at greatly reduced blower horsepower requirements. Their "air screw action" also eliminates shock delivery of air. This feature combined with high adiabatic efficiency means a relatively cooler discharge air temperature, resulting in increased cylinder charge density for a given cylinder volume and pressure. The net gain — greater horsepower per pound from your diesel engine.

Another feature—*lower noise level.* Unbiased tests prove Standardaire Blowers have 8 to 15 decibels lower noise rating than comparable blowers of the positive displacement type.

Our engineers are prepared to help you adapt the Standardaire Blower to meet your operating conditions. Write Dept. C-28. The Standard Stoker Co., Inc., 370 Lexington Avenue, New York 17, N. Y.



THE STANDARD STOKER CO • INC •

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Nordberg Distributor

The Nordberg Manufacturing Co., Milwaukee 7, Wisconsin, announces the appointment of Prime-Best, Inc., 3820 West Villard Avenue, Milwaukee as distributors for the Nordberg 4FS diesel engines in the southeastern territory of Wisconsin. Prime-Best, Inc. maintains branch offices in Racine, Elkhorn and Madison. Its Milwaukee service department is staffed by experienced mechanics under the direction of Mr. A. Marose, service manager. Mr. W. C. Best is president of the organization and Mr. C. J. Eckland is sales manager. The Nordberg 4FS diesels which Prime-Best will handle are built in one and two-cylinder models with a 4½-inch bore and 5¼-inch stroke. Power ranges from 10 to 30 hp. within an operating speed range of 1,200 to 1,800 rpm. These 4-cycle, heavy, duty, vertical engines are designed for stationary or portable power use and marine auxiliary uses.

Pullman Acquires Isaacson Iron Works

The Pullman-Standard Car Manufacturing Co. entered the tractor allied equipment field with the acquisition of the Isaacson Iron Works. Isaacson products are utilized with crawler-type tractors primarily in the earth-moving field. They are sold throughout the United States by the same distributors handling the marketing of International Harvester crawler-type tractors on which Isaacson equipment is used. Foreign sales are handled through International Harvester Export Company. Manufacturing plants are located in Seattle, Washington and Rockford, Illinois. The phase of activity now being carried on at the Seattle plant, however, will be transferred as soon as possible to the Hammond, Indiana plant of Pullman-Standard. Operation of the Rockford plant will be continued by Pullman-Standard.

Two Appointments by Worthington

Wilbur R. Leopold

Wilbur R. Leopold has been appointed assistant to Vice-President T. Cruthers of Worthington Pump and Machinery Corporation, Harrison, N. J., and will function on public works projects, according to an announcement by W. H. Feldmann, vice-president in charge of sales. For five years prior to this appointment, Mr. Leopold was manager of Worthington's Detroit office. He is a member of the Detroit Board of Commerce and the Engineering Society of Detroit. Clarence S. Wentworth will fill the post of manager of the Detroit office. He has been a general line salesman in Chicago.

Badwin-Lima-Hamilton Consolidation

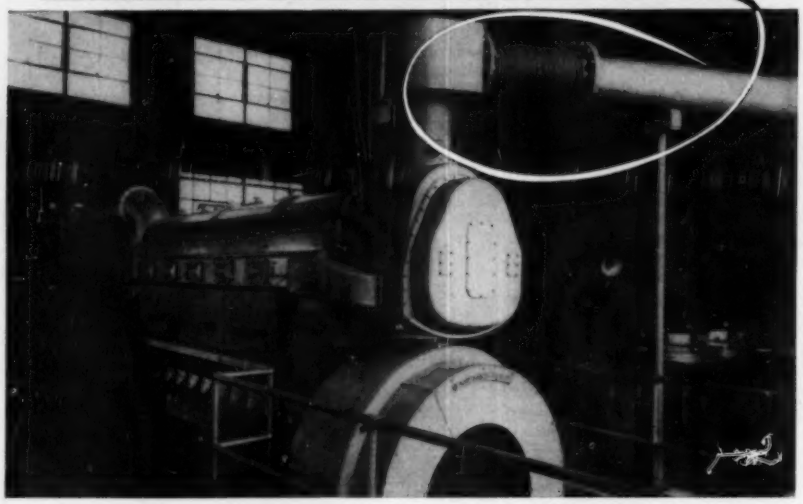
The Baldwin Locomotive Works and Lima-Hamilton Corporation recently consummated the previously announced agreement between the two companies under which Baldwin purchased and acquired substantially all of Lima's assets in exchange for shares of Baldwin common stock. The name of The Baldwin Locomotive Works has been changed to Baldwin-Lima-Hamilton Corporation. Heading Baldwin-Lima-Hamilton are Marvin W. Smith, who remains as president, and George A. Rentschler, chairman of the board. Charles E. Brinley resigned as chairman of the Baldwin board but will continue as a director.

The Baldwin-Lima-Hamilton Corporation subsequently announced the booking of orders for 58 diesel-electric locomotives of various types for the following customers: Reading Company; Western Maryland; Pittsburgh and West Virginia; Soo Line; Savannah and Atlanta; Missouri Pacific; Oliver Iron Mining Company; Weyerhaeuser Timber Company; Sharon Steel Corporation; and Tennessee Coal, Iron and Railroad Company.

A new four page bulletin, No. 320, has been issued by Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pa., which describes the Baldwin Series 700 diesel engines. The bulletin includes design features, specifications, cross sectional drawings, performance curves and ratings. These engines are 4-cycle with a 17-inch bore, 20-inch stroke and speed range from 257 to 375 rpm. Horsepower ratings are from 710 hp. for 6-cylinder, normally aspirated, to 2,080 hp. for 8-cylinder, supercharged engines. Chief use is in generator drive for electric power and other stationary power services. It is also suited for marine use.

DIESEL ENGINE CATALOG is just off the press in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 29.

MAINTENANCE FREE



CMH Flexible Connectors for Internal Combustion Engines

Connector problems for internal combustion engines are solved efficiently and safely when you use CMH Flexible Connectors. They absorb expansion and contraction . . . correct for misalignment . . . control vibration. CMH Flexible Connectors require no maintenance—all metal connector and coupling assembly needs no packing, does not leak. Safe, dependable and long-lived for exhaust lines or air intake. Available in choice of steel or stainless steel with flanged or welding ends. Standard diameters from 1 inch to 30 inches.

In its complete line of flexible metal hose products CMH also manufactures lines for fuel, oil, compressed air, water, lubrication, etc. Write for complete information.

Whatever the application, CMH Flexible Connectors give dependable service. In the installation pictured the connector is being used in the intake line to the scavenging blower of this diesel.

Flexon identifies CMH products that have served industry for over 48 years

CHICAGO METAL HOSE Corporation

1325 S. Third Avenue • Maywood, Illinois • Plants at Maywood, Elgin and Rock Falls, Ill.
In Canada: Canadian Metal Hose Co., Ltd., Brampton, Ont.

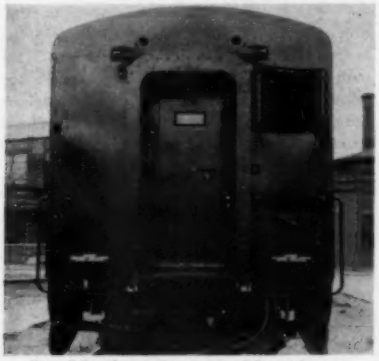
CMH ONE DEPENDABLE SOURCE for every flexible metal hose requirement

New Alco-GE Locomotives

The newly designed four-unit 6400 hp. dual-purpose locomotives are taking part in a nationwide demonstration tour, it was announced by American Locomotive and General Electric. This is the latest model of the Alco-GE freight locomotive of which about 1,000,000 horsepower has been delivered since 1945. Installation of steam generating equipment as a modification and optional traction motor gearing enables railroads to utilize this 1600 hp. locomotive in regular passenger service. Weight has been increased from 230,000 to 240,000 pounds and length increased about two feet. A steam generator delivering 2,750 pounds of steam per hour may be applied in the "A" unit and one of either 2,750 or 4,500 pounds per hour capacity may be installed in the "B" unit. Latest traction design gives nearly 25% more continuous effort than formerly.

Each locomotive is mounted on two 4-wheel pedestal-type, swing-motion trucks.

Optional gearing provides for maximum speeds of 65 through 92 mph. The new motor has a continuous tractive effort capacity of 52,500 pounds when geared for a maximum 65 mph. Approved traction motor overhaul period has been increased to 300,000 miles. Redesigning of the engine governor reduced the number of moving parts and provides greater interchangeability. The oil reservoir, smaller and part of the governor, provides a window for checking the oil level.



One of the after-coolers, upper right, at the rear of the new Alco-GE locomotive.

Full pressure engine lubrication is provided by a gear-type pump. A by-pass filter system permits greater flow of oil in cold weather starting. For more complete removal of water from compressed air and more efficiency in the brake system in winter, piping has been moved to the cab interior and two aftercoolers have been installed.

Rochester GAUGES

ARE BUILT TO STAY ACCURATE

ON RUGGED SERVICE

When you design engines for heavy work, you make them tough enough to take plenty of hard knocks. Rochester instruments are built that way, too . . . for rugged service on your hard-working truck, tractor, auto, marine and industrial engines, both gas and diesel.

Rochester ammeters and temperature and pressure gauges are made of long-wearing metals to last as long as the engine itself. Their accurate, highly sensitive movements are protected with vibration and pulsation dampeners . . . and permanently sealed against water and dust. They always retain their original accuracy, too, even under high overloads.

Famous more than 35 years for long, dependable performance on heavy-duty service, Rochester instruments are specified as standard equipment by nearly all leading tractor and many other engine manufacturers. Bulletins on request. ROCHESTER MANUFACTURING CO., INC., 101 Rockwood St., Rochester 10, N. Y.

ROCHESTER DEPENDABLE ACCURACY GAUGES

ROCHESTER MANUFACTURING CO., INC.

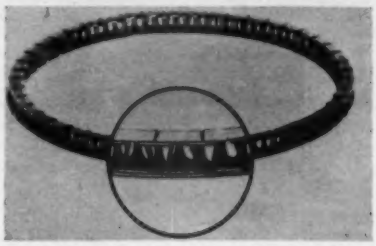
DIAL THERMOMETERS GAUGES AMMETERS

Three New Developments Announced by Muskegon

A new oil control piston ring with a very low rate of tension loss, a new all-metal oil seal ring with unusually wide temperature range, and a new high strength alloy iron for piston rings are three recent developments by Muskegon Piston Ring Company, Muskegon, Michigan.

The new "Flexline" oil control rings are one-piece steel rings of the circumferentially compressible type, designed for automotive passenger car and truck engines. Features of the new ring include complete side sealing of the openings between the segments forming the ring lands, together with unusually high resistance to carbon plugging. Tension loss resulting from wear occurs very slowly. Another outstanding feature of the "Flexline" ring is its ability to conform to all cylinder contours.

"Multiseal" oil rings, for use in automatic transmissions, are a new application of an old and proven principle for sealing pressures. Full use is made of multiple sealing members acting independently on their periphery and utilizing the labyrinth action, with positive gap sealing to prevent leakage under pressure of oils and other fluids. All-metal in construction, "Multiseal" rings eliminate the temperature limitations of non-metallic packings, and they function at temperatures as low as −70°F. and as high as 450°F. They are available in diameters from 2 inches to 24 inches.



"Spartalloy ECH-101," originally developed for aircraft piston rings, is a new type high strength alloy iron now available for other piston ring applications where its high strength and thermal stability enable it to withstand unusually severe operating abuse. "ECH-101" is of the controlled structure type, electrically melted, centrifugally cast, and specially heat treated to provide top physical properties. Its tensile strength is 88,000 pounds psi. minimum. Its metallographic structure is characterized by a matrix of spheroidized, tempered martensite, graphite being present in temper carbon form.

Further information can be obtained from Muskegon Piston Ring Company, Muskegon, Michigan.

Engineer Lectures in England

C. G. A. Rosen

A review of diesel engine development at the Research Laboratory of Caterpillar Tractor Co. was given as the James Clayton Lecture at the general meeting of the Automobile Division, Institution of Mechanical Engineers, London, England, recently by C. G. A. Rosen, former director of research at Caterpillar and now consulting engineer. Mr. Rosen is the sixth man so awarded the annual James Clayton Lecture honor and only the second American. Entitled "Significant Contributions of the Diesel Research Laboratory," Mr. Rosen's address dealt with the precombustion-chamber process, the composition of combustion gases, flame duration, temperature distribution, the mechanism of ignition, and combustion-chamber deposits. He also discussed the development of fuel-injection equipment, pretiming, precalibrating, and the evolution of the fuel pump.

Diesel Locomotives on Increase

More new locomotives were put in service in the first ten months of 1950 than in any corresponding period in the past 27 years. In that period, 1,932 locomotives were placed in service of which 1,915 were diesels, nine steam and eight electric.

DIESEL ENGINE CATALOG is just off the press in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 29.

More POWER... Less SPACE
WITH
STERLING VIKING DIESELS

This 8-cylinder turbo-supercharged Viking Diesel is conservatively rated at 750 hp. Sterling Diesels are available in five different models beginning at 100 hp.

DIESEL POWER
for all
INDUSTRY

AUTOMATIC POWER PLANTS
DRILLING RIGS — HOISTS
LOCOMOTIVES — PIPE LINES
GENERATOR SETS
FISHING CRAFT — DREDGES
LIFT BRIDGES — TOW BOATS
COMPRESSORS — AIRPORTS
VENTILATING SYSTEMS
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Sterling Viking Diesel engines offer definite advantages in:

Compactness . . . more power in less space. A high ratio of horsepower to weight.

Sturdy construction . . . one piece block and base. All working parts are easily accessible.

Dependability . . . Service records show a high operating efficiency, low maintenance cost. All Sterling Diesels are conservatively rated, built to deliver smooth performance over their full power range.

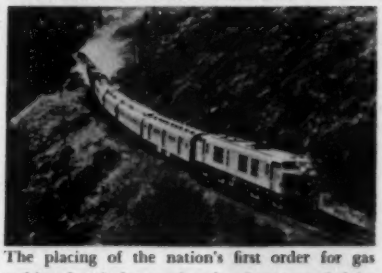
Without cost or obligation, talk over your power requirements with an **experienced** Sterling engineer. We invite your call and the opportunity to bring you up to date on Sterling's accomplishments.

STERLING ENGINE COMPANY

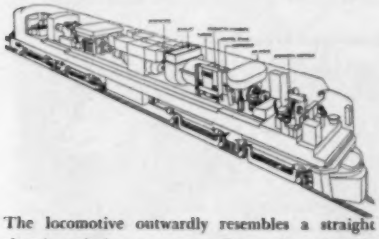
1270 Niagara St. Telephone Lincoln 0382 Buffalo 13, N. Y.

Sterling Viking Diesel Engines from 100 to 750 hp.—Sterling Gasoline & Gas Engines from 100 to 600 hp.

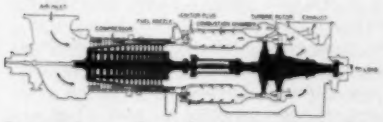
Gas Turbine-Electric Locomotives



The placing of the nation's first order for gas turbine-electric locomotives has been revealed by A. E. Stoddard, Union Pacific president. These Alco-GE locomotives are similar to the 4,500 hp. unit which has been undergoing tests on regular freight runs of the Union Pacific for the past year and a half. Mr. Stoddard disclosed that the new locomotives will be assigned to regular freight service and will permit the railroad to "evaluate more fully, under a wide variety of operating conditions, the potentialities of this new type of motive power. On the basis of results to date, the gas turbine-electric unit looks promising as an addition to steam and diesel-electric power," Mr. Stoddard added. "Tests to date have proved most encouraging."



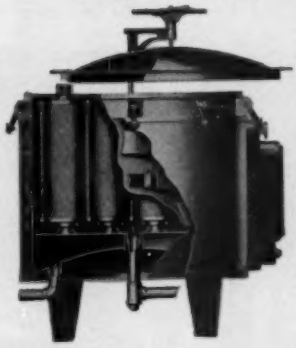
The locomotive outwardly resembles a straight electric unit in appearance. It requires virtually no water, has few moving parts and uses low cost bunker C oil as fuel. The power plant is similar in principle to the power plant in jet planes except that there is no jet effect. In the locomotive the turbine is connected through reduction gears to electric generators. The locomotives will be geared for freight service and will have a top speed of 65 mph.



In reporting on the performance of the developmental unit on the Union Pacific, Mr. G. W. Wilson, manager of the G-E Locomotive and Car Equipment Divisions, said it has operated nearly 80,000 miles in regular freight service and handled 285,800,000 gross ton-miles. The turbine power plant has been in operation nearly 5,000 hours. The new locomotives will be 83 feet, 7½ inches long over knuckles; 14 feet, 3 inches high over the roof sheets and will negotiate curves of 288-foot radius. Running gear will consist of four 2-axle trucks with each truck equipped with two traction motors. Weight will be about 253 tons. General Electric will build the Alco-GE locomotives at its plant in Erie, Pa. Delivery of the new units are expected to begin some time during the later part of 1951.

Less time for a change!

HOFFMAN Cartridge Filters



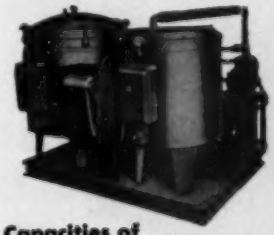
Simplify Cartridge Replacement with Exclusive Cover-Lifting Device

Along with efficient filtering at high flow rates, Hoffman Cartridge Filters provide maximum service convenience. Exclusive cover-lifting device speeds up cartridge change – either the 7 x 18 size, for Navy throw-away cartridges, or the 11 x 18, for repackable or throw-away types, offer this feature. Swing bolts fasten the cover – an additional advantage for cartridge changes.

FOR LUBRICATING, FUEL OR INDUSTRIAL OILS

Two sizes: I-718 for 7 x 18 Navy-size throw-away cartridges in multiples of 1, 2, 4, 7, 9, 14, and 18 cartridges. I-1118 series, for either repackable or throw-away cartridges, in multiples of 1, 2, 3, 4, 6, and 8 cartridges.

Write for bulletins A-703 and A-649 respectively.



Complete Recovery of Used Oil

–The HOFFMAN OIL CONDITIONER

Removes insolubles, as well as solubles, to cut new oil costs. Unit consists of Hoffman Vaporizer (to remove oil, gas, moisture and fuel dilution) . . . Cartridge Filter to remove solubles. Mounted on a common base . . . only 2 moving parts . . . no steam or water connections.

Capacities of 50 to 600 g.p.h.

Write for Bulletin A-667 and A-668

FILTRATION ENGINEERING SERVICE... For the right answer to your filtering problems, a Hoffman filtration engineer will survey your requirements and furnish recommendations based on detailed analysis of all factors. Ask for this service—There is no obligation.

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UNITED STATES HOFFMAN MACHINERY CORPORATION

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CANADIAN PLANT: CANADIAN HOFFMAN MACHINERY CO., LTD., NEWMARKET, ONT.

Assistant Chief Engineer

Walter E. Thill

Advancement of Walter E. Thill to assisant chief engineer is announced by H. F. Dixon, chief engineer of Federal-Mogul Corporation, Detroit, manufacturers of engine bearings and related items. For the past three years Mr. Thill has directed field engineering for Federal-Mogul Service and is well known for his educational activities. He recently supervised the revision of Federal-Mogul's "Engine Bearing Service Manual" which is now in its sixth edition. Mr. Thill is an active member of S.A.E. and participates in the activities of other engineering societies.

New Noise Abatment Equipment

The development of noise abating and safety equipment especially designed for engines using natural gas as fuel has been announced by the Burgess-Manning Company of Libertyville, Ill. According to the company's statement, the new series of snubbers not only reduce exhaust noises but can also be used to decrease hazards of fire and explosion. The series, it was explained, can be used with or without "fog jet" which sprays a cooling mist of water vapor on the exhaust entering the snubber. Exhaust quieting is effected by coaxial snubbing which "disperse the high pressure slugs of the exhaust stream in the first chamber which is followed by a second standard snubbing chamber." The snubber series include the high inlet feature for economy in erecting and piping with overhead manifolds. Sizes range from 49 to 7,275 pounds.

"Dirt Check Window" Oil Filter

Carlos D. Kelly, vice-president in charge of sales of Purolator Products, Inc., announces an innovation in oil filter elements. The manufacturer considers the "Dirt Check Window" oil filter element a major step in assisting the service attendant or garage mechanic to determine quickly and accurately when an oil filter has served its useful purpose. The "Dirt Check Window" provides a means of observing the amount of sludge that has been filtered from the lubricating oil. It is a visual method for establishing definitely when a filter refill is required, eliminating guesswork. If inspection indicates that the element is capable of further service, it can be quickly reinstalled.

Dieselized River Boat

Loading at Camden, New Jersey for an ocean crossing to Monrovia, Africa, is Farrell Lines' 123 ft. river cargo carrier *Cestos*. She is to be put in service transporting baled and liquid rubber from jungle plantations to African coastal shipping points. Although designed exclusively for river travel, the *Cestos* completed her ocean voyage uneventfully in thirty days. The boat has a draft of 4½-ft., a beam of 28½-ft. and is powered by two General Motors 6-cylinder diesel engines. She was designed by Sparkman and Stevens of New York and completed last October at John H. Mathis Shipyard at Camden, New Jersey.

Chief Engineer Honored

Melvin O. Sten, chief engineer of Hunt-Spiller Manufacturing Corp., Boston, recently completed 25 years of service with the 140-year-old company, producer of diesel engine castings. In an informal plant ceremony marking the anniversary, A. J. Edgar, vice-president and general manager, presented Mr. Sten with his quarter-century pin. A graduate of Northeastern University, Mr. Sten joined Hunt-Spiller in 1925 as a draftsman.

Since 1885
UNSURPASSED DEPENDABILITY...
Today's modern UNION Diesel products* incorporate and pioneer improvements which assure unsurpassed dependability for your —
Greater Safety • Lower Operating Costs
Long Term Satisfaction • Increased Profits
*DIESEL ENGINES
DUAL-FUEL ENGINES
GENERATOR SETS
HEAT EXCHANGERS
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CUSTOM MACHINERY
UNION DIESEL
2121 DIESEL STREET • OAKLAND 6, CALIFORNIA, U.S.A.

New West Texas Home

The new home for Stewart & Stevenson Services at 1624 4th Avenue, Lubbock, Texas, was recently opened in the West Texas area. The new store is larger and more modern than the old quarters. Stewart & Stevenson Services are distributors for General Motors Diesel Engines, Chrysler

Twin Disc Announces Two Appointments

Paul W. Wahler

Robert A. Harmon

The Twin Disc Clutch Company, Racine, Wisconsin, announced the appointment of Mr. Paul W. Wahler as service manager and Mr. Robert A. Harmon as dealer sales supervisor. Both men will make their headquarters in Racine. Mr. Wahler joined the engineering department of the company in 1937 as an engineering assistant. In 1940, he became a district service engineer stationed in Seattle, Washington. He entered the Army in 1941 as a First Lieutenant and reverted to inactive duty as a Lieutenant Colonel in 1946 after overseas duty in the European Theatre. After returning from the Armed Forces, he became district service engineer in the New Orleans area, then returned to the West Coast as assistant district manager. Mr. Wahler is a graduate mechanical engineer from the University of Wisconsin. In his new duties he will supervise all service operations through the five factory owned parts stations which supply parts to all Twin Disc outlets.

Mr. Harmon, the new dealer sales supervisor, has been connected with sales engineering since joining Twin Disc more than three years ago. He served as field representative and as eastern district sales engineer before promotion to his present duties of coordinating all dealer sales activities. Mr. Harmon received his pilot's training in the Air Force and after flying 31 missions with the 25th Fighter Squadron in China was released to inactive duty as a First Lieutenant late in 1945. He is a graduate of Case Institute of Technology, Cleveland, Ohio.

DIESEL ENGINE CATALOG is just off the press in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 29.

DIAMOND

FIXED CENTER DRIVES

Diamond Roller Chain fixed center fuel pump drive on Buda Model 6BD-230—6 cylinder diesel. 20T driver from camshaft to 20T driven fuel pump sprocket. Centers, 4.750" fixed.

Simplify Engine Design Eliminate Extra Idler Gear Shaft

● Widening use of Diamond Roller Chains on engines includes a great variety of timing, auxiliary, accessory and power take-off drives.

In the case of fuel pump drives there are a number of advantages aside from the high efficiency, great reserve strength and long life performance. Diamond Roller Chains save space—and operating on fixed centers, the extra idler gear shaft can be omitted. Design is simplified.

Recommendations by the Diamond engineering staff based on many years of engine application experience can help save your time in making appropriate selection.

DIAMOND CHAIN COMPANY, Inc.
Dept. 407, 402 Kentucky Avenue,
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DIAMOND ROLLER CHAINS

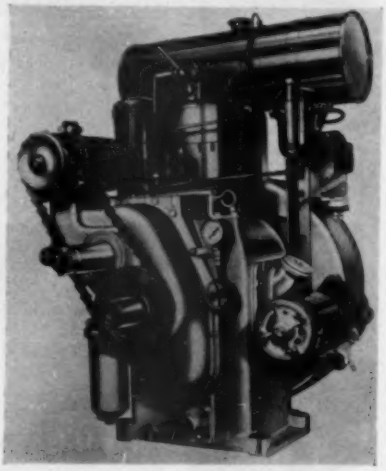
Elected Executive Vice-President

Foster N. Perry

Foster N. Perry has been elected executive vice-president of the American Bosch Corporation, Springfield, Mass., according to an announcement by Donald P. Hess, president. Mr. Perry has been vice-president of the corporation for the past ten years during which period he has been in charge of manufacturers sales. Mr. Perry has been continuously associated with the organization since he commenced his business career in 1924, for the most part in field engineering and in sales capacities. Prior to his election as a vice-president in 1940, when he returned to Springfield, he had been manager of the Eastern sales territory with headquarters in New York and Chicago respectively. For two years at the outset of World War II, he was engineering manager. Mr. Perry is active in various professional groups related to the automotive and diesel industries and is a member of the Society of Automotive Engineers.

Two Air-Cooled Diesels Enter American Field

Lister-Blackstone, Inc. of New York recently unveiled to the public the one and two-cylinder models of the Armstrong-Siddeley air-cooled diesels for which the New York concern has completed marketing arrangements in this country. Mr. Walter Karri-Davies, president of Lister-Blackstone, Inc., in commenting briefly on this new arrangement, emphasized the fact that a full stock of replacement parts preceded receipt of even the first two display engines from England. This is in line with Lister-Blackstone's policy to provide prompt and adequate service wherever they sell engines. This arrangement brings to the American market a larger air-cooled diesel than has heretofore been available here.



The one-cylinder Armstrong-Siddeley air-cooled diesel.

This is the two-cylinder Armstrong-Siddeley engine which develops 20 hp. at 1,800 rpm. The single cylinder engine is rated 8 hp. at 1,500 rpm. and both models have a bore of 4¼ inches and a stroke of 4¼ inches. Thousands of these engines are in service throughout the world under all extremes of climatic conditions. The single cylinder engine has been chosen by the Dutch government to power a number of unattended lighthouses. The Armstrong-Siddeley diesels are well suited to generator service developing from 3 to 10 kw. Both models may be furnished with standard S.A.E. bell housing mounted on the flywheel cowl that will accept standard generator housings. Flywheel driving member and adapter ring accept a standard No. 4 S.A.E. clutch. Other services as well as generating duty invite consideration of the Armstrong-Siddeley air-cooled diesels. The two-cylinder model is ideal as a marine propulsion unit and both models are giving economical and dependable service in powering farm machinery, pumps of all types, brick crushers, compressors, cement mixers, saw mills, etc. Both models afford virtually effortless cold starting by hand. However, standard Electric Auto-Lite starters and generators will be mounted if specified. An unusually low rate of fuel consumption indicates extremely economical cost of operation. A comprehensive stock of these air-cooled engines and spare parts is available for immediate delivery at this time through the Lister Blackstone nationwide distribution organization. A demonstration tour of one of the units is currently being conducted at plants of the leading Original Equipment Manufacturers throughout the Middle West.

ALMOST KILLED THE GOOSE!

Diesel liners get some mighty destructive treatment. So did Mexico, under Hernando Cortez.

For three years, he rode rough-shod over the Aztecs, massacring them and tearing down their cities to get his hands on more and more treasure.

Yet even the old Spanish conquistador finally saw that to keep it up would kill the goose — and leave him fresh out of golden eggs. So, in 1521 he began restoring all the damage.

Yes, that restoration paid him handsome profits—just as PORUS-KROME* and VANDERLOY M pay Diesel users. They are particularly glad now — with replacement parts in critical supply—to have long-wearing PORUS-KROME liners, that can be renewed almost indefinitely.

As for engine parts already made useless by the practice of remachining their bearing diameters — well, even junk liners — and *crankshafts* too — are restored to original dimensions with VANDERLOY M. It gives them a longer service life than new ones. And each restoration costs as little as the first.

**PORUS-KROME is dense, hard, wear and corrosion-resistant chromium applied by the exclusive Van der Horst process which gives working surfaces an infinite number of tiny oil-resisting reservoirs for perfected lubrication.*

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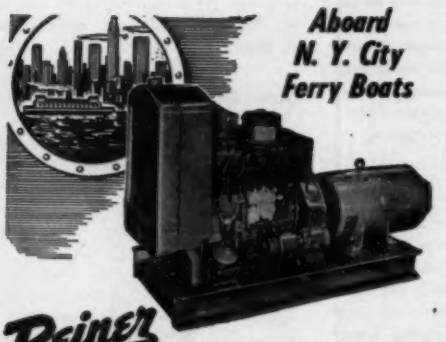
PORUS - KROME VAN DER HORST

Found for the Life of Your Engine



Aboard N. Y. City Ferry Boats

Reiner DIESEL GENERATORS

The Reiner 10-kw. diesel generator above is one of several used on N.Y.C. ferry boats. It's the choice because it easily meets the rigid requirements set up for this service.

Whatever your power needs — generators, pumps or compressors — diesel, gas or gasoline driven — Reiner can meet them from a wide range of standard and custom built models. Write for details.

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FREE BULLETINS on standard units sent on request. Write today, stating your requirements.

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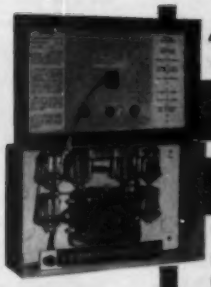

Full Automatic

DIESEL • GASOLINE • GAS

Dependable Synchro-Start controls provide full automatic starting and stopping according to the operation of any type of pilot switch. Full protection is provided all the time the engine is starting or running. In case of an abnormal condition, such as low oil pressure, overheating, overspeeding, failure to start, etc., the engine will be shut down before any damage can occur and a visual signal will show the exact cause of failure.

Automatic
Full
Automatic
Visual or Audible

Write today for the new Synchro-Start catalog, or see your engine dealer.

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Automatic Engine Control Equipment
1046 W. FULLERTON AVE., CHICAGO 14, ILL.
Phone Bittersweet 8-3511

Honan-Crane Cuts Diesel Overhaul 50%

A report from Lindsborg, Kansas Municipal Power Station says—

"Since installation of Honan-Crane purifiers, improvement in the *condition of oil* and in *engine cleanliness* has been so marked that city engineers plan to pull pistons *only once* every two years instead of every year as has been their custom."

ONLY A HONAN-CRANE OIL PURIFIER GIVES YOU THIS KIND OF PROTECTION

Write today for complete information

HONAN-CRANE CORPORATION
202 INDIANAPOLIS AVENUE, LEBANON, INDIANA
A SUBSIDIARY OF
HOUDAILLE-HERSHEY CORP.

Honan-Crane purifier using Cranite (specially processed Fuller's earth) continuously serves the 1200 HP. Model 33FD Fairbanks, Morse dual fuel unit at Lindsborg, Kansas Municipal Power Station

Appointment of District Manager

P. B. "Pete" Erwin

P. B. "Pete" Erwin has been appointed district manager of the Los Angeles branch office of Enterprise Engine & Machinery Co., it was announced by James E. Watson, general sales manager. Long identified with the southern California oil industry, Erwin served with Bethlehem Supply Company of California for twelve years, where he was manager of machinery sales. Prior to that he was with Union Oil Company in the Los Angeles area as superintendent of power maintenance.

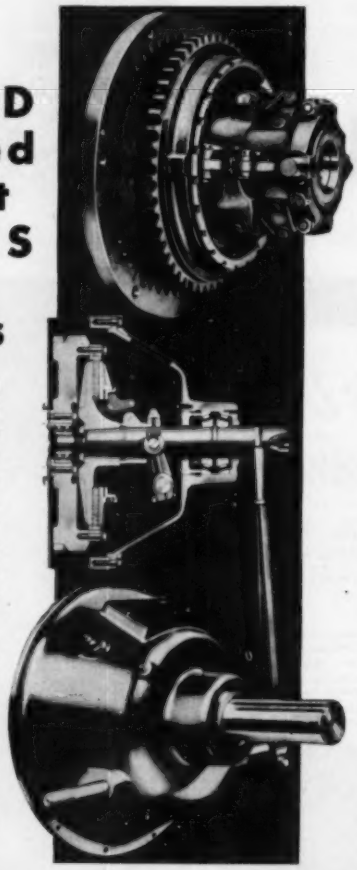
In his new capacity as district manager with Enterprise, Mr. Erwin's primary activities will be in oil field, pipe line and stationary engine sales. This addition to Enterprise's field staff is consistent with the company's program of engine sales and service expansion. Mr. Erwin will make his headquarters at Enterprise Engine & Machinery Co., General Metals Corp., 5701 So. Boyle Avenue, Los Angeles.

Deceased

Mr. Dudley G. Bolton, who was for many years Branch Manager for Fairbanks, Morse & Co., at Dallas, Texas, passed away in a Dallas hospital November 1, 1950. He had been with the Fairbanks-Morse organization since 1906 and had held numerous positions with the company, being Branch Manager at Denver, Colorado, Salt Lake City, Utah and Dallas, until his reirement some years ago. He is survived by his wife and daughter, Mrs. Weldon L. Moore and one grandson, all of Dallas, Texas.

New

ROCKFORD Simplified Low Cost CLUTCHES *for* Power Take-Offs



This newly developed, simplified heavy duty type clutch uses fewer parts, thus can be produced at lower cost. Its design provides for cleaning and cooling through air circulation between the clutch body and pressure plate. Centrifugal action is offset by the toggles being anchored nearer center of the shaft. Self-engaging tendency is overcome by a new toggle lever design. Pressure is spread evenly over the entire friction surface. Accurate balance insures smooth operation. Sizes fit in standard S.A.E. flywheel housings. Convenient adjustment requires no special tools.

Send for This Handy Bulletin

Gives dimensions, capacity tables and complete specifications. Suggests typical applications and makes helpful recommendations for planning efficient power take-off drives.

BW

ROCKFORD CLUTCH DIVISION BORG-WARNER

1321 Eighteenth Avenue, Rockford, Illinois, U. S. A.

Dutch Rescue Boats

When a ship in distress off the coast of Holland signals the Dutch Rescue Company of Rotterdam, Holland, for help a matter of minutes may often determine the success or failure of the rescue mission. To increase the chances for success, the company has replaced older diesels which powered four of its rescue boats with modern high-speed diesel engines. As a result, the speed of the vessels has been increased almost 50% and time that used to be lost pre-heating the old engines to necessary starting temperatures has been eliminated entirely. Now, when a distress call comes in, these speedier engines are ready to go at the press of a button. Finger-tip control and hydraulically actuated reverse gears on the new 2-cycle engines result in more responsive action and greater maneuverability. In heavy seas, when propellers are in and out of the water, quick-acting governors keep the engines close to their set rpm. and more satisfactory progress is made to the scene of distress. The craft are of steel construction 56 ft. in length with a beam of 13 ft. The new power in three of the boats is a matched pair of 4-cylinder GM Series 71 diesel engines with General Motors hydraulic reverse gears. Propulsion is through 3:1 reduction to twin 4-bladed 32 inch propellers. A fourth boat has been repowered by a six-cylinder GM diesel driving a single screw.

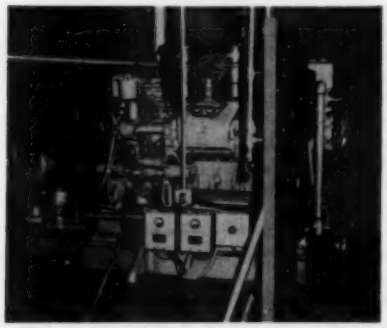
Retiring Vice-President

L. A. Keeler

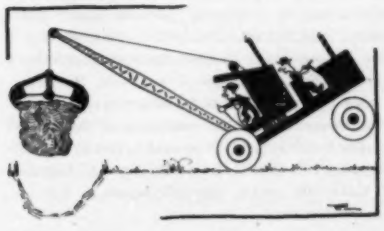
L. A. Keller, vice-president, director and comptroller of Fairbanks, Morse & Co., Chicago manufacturers, for the past decade, retired at the end of 1950. His retirement came after thirty-nine years of service with the company. Mr. Keeler is also retiring as a director and officer of the Canadian Fairbanks-Morse Company, Limited; Fairbanks, Morse de Mexico, S. A.; director of the Canadian Locomotive Company, Ltd.; and president of the John Morse Memorial Foundation. His immediate plans include a winter vacation with Mrs. Keeler in Arizona and a motor trip to the West Coast.

Airport Fire Protection

The possibility of power failure due to storm or fire conditions when dependent on electric motor driven fire pumps has always been uppermost in the minds of airline and airport operators. To meet such emergencies on the field, completely automatic auxiliary internal combustion engine driven fire pumps have been installed in many hangars. A typical example of such installations are the two new American Airlines hangars at Chicago's Midway Airport, which cover a city block in length and were built at a cost of $3,000,000. Each hangar may house as many as five DC6's at one time and, at $650,000 per plane, the sprinkler system has the responsibility of protecting close to $10,000 worth of property.



The auxiliary engine driven pump is equipped with a completely automatic Universal Engine Controller, built by Synchro-Start Products, Inc., for the A. F. Barron Company of Chicago. In the boiler room, there are three fire pumps built by the Peerless Pump Company. They are capable of delivering 2,000 gallons a minute at 100 psi. They are driven by two 150-hp. GE electric motors and one General Motors diesel engine. The first electric motor starts when water pressure drops to 90 lbs., and the second motor starts when pressure drops to 85 lbs. Below 85 lbs., the automatic controller will start the diesel and keep it running until the pressure is built up to normal. Should the electric power operating the electric motors be "off" or "fail" at any time, the auxiliary engine driven fire pump is started instantly by the automatic controls. At the same field, Delta Airlines and Capital Airlines are similarly protected by General Motors diesels.



You will find Johnson engineers willing to help you decide which type bearing is best suited and to design it to the application. Write, wire or call today!

The wide Variety of uses for diesel engines certainly demands specialized engineering. Each type of engine must be built for specific operating conditions. Likewise, the bearings, as well as other parts, need to be designed for the required load, shock, speed, temperature and other service considerations. Johnson Bronze furnishes the bearings for a majority of the diesel builders because, through extensive research and engineering cooperation, we have designed and produced the right bearings. Among the preferred types are aluminum alloy bearings and lead or tin base babbitt on either bronze or steel backs. Every Johnson bearing is made of quality material and finished to precise specifications.

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ST. LOUIS • SAN FRANCISCO • SEATTLE

Appointed Assistant to Borg-Warner President

Paul J. Larsen

Paul J. Larsen, former director of the Office of Civil Defense of the National Security Resources Board, has been appointed assistant to Roy C. Ingersoll, president of Borg-Warner Corp. Mr. Larsen resigned his post of director of the Office of Civil Defense after having completed the National Civil Defense Plan which was approved by Congress. In the years immediately after the war, Mr. Larsen served as director of Sandia Laboratory, a branch of the University of California's Los Alamos Scientific Laboratory, at Sandia, N. M.

Diesel-Propelled Towboat

Dravo Corporation announced the receipt of an award from the Carnegie-Illinois Steel Corporation for the construction of a twin-screw, diesel-propelled towboat. It will duplicate six other boats now under construction at Dravo's Neville Island shipyard; two each for Jones & Laughlin Steel Corporation and Pittsburgh Consolidation Coal Company and one each for Crucible Steel Company of America and Island Creek Fuel and Transportation Company. Carnegie-Illinois will use the boat to tow coal to their Clairton Works on the Monongahela River.

Gas Pipeline Expansions Stimulates Sales and Production

In an interview recently, Hobart C. Ramsey, president, Worthington Pump and Machinery Corporation, stated that his company is playing a large part in the enormous programs of the natural gas industry. Existing transmission pipeline systems are rapidly expanding in almost every section of the United States, while plans for several additional new lines are being projected.

Since January, 1950, when the Tennessee Gas Transmission Company placed the first Worthington uniflo gas engine gas compressor, designed particularly for gas pipeline service, into operation at West Monroe, La., over one hundred units of this type have been ordered by major pipeline companies. This volume of new business has contributed substantially to the corporation's backlog of unfilled orders and a well-balanced load for the corporation's productive facilities. Mr. Ramsey described this new type gas engine, known as type UTC-16, as a vertical, in-line engine, built integral with horizontal compressor cylinders. For the first time the distinct advantages of the uniflo design were made available in engines for gas pipeline service. The excellent performance of the engine, made possible by improved through-scavenging, highly efficient combustion, and cooler operation, attracted the interest of engineers and other gas transmission operating officials from various parts of the country, as they witnessed the tests at West Monroe in January, Mr. Ramsey said. At the present time, orders on the books for these engines aggregate upwards of twelve million dollars, representing an approximate aggregate of 175,000 hp.

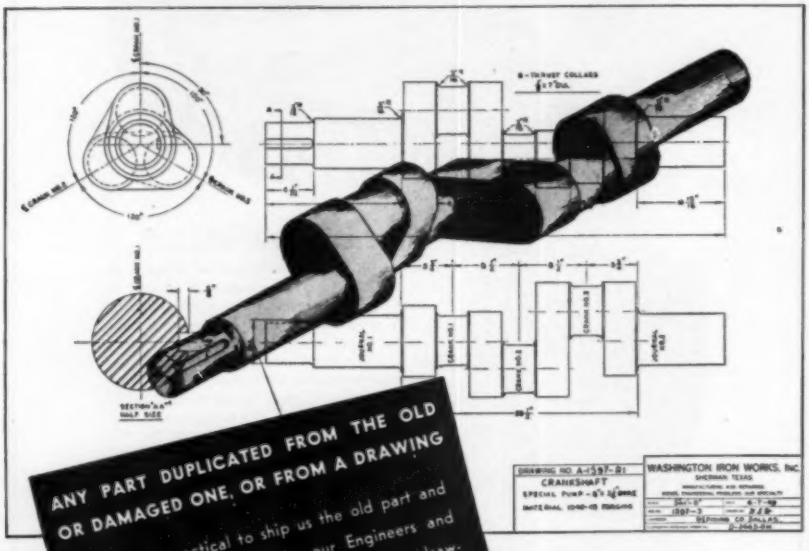
Among the important pipeline companies which will place these engines in service in the near future are Arkansas-Louisiana Gas Company; El Paso Natural Gas Company; Kansas Nebraska Natural Gas Company; Michigan Wisconsin Pipeline Company; Northern Natural Gas Company; Southern Natural Gas Company; Tennessee Gas Transmission Company; Texas-Illinois Natural Gas Pipeline Company; United Gas Pipeline Company.

Diesel Engine Catalog

One hundred and twenty-one Fairbanks, Morse diesel salesmen have invested $1210.00 in individual copies of the DIESEL ENGINE CATALOG for the simple reason that these 121 diesel salesmen have found this book extremely useful to them in their day by day operations. Possibly one of the reasons for so many salesmen of this one company deciding to carry this book around with them in their cars is that all competitive information is contained between these two covers. This DIESEL ENGINE CATALOG, Volume 15, contains a detailed description of every diesel engine manufactured and sold in these United States. Its price of $10.00 is a very low one when compared with the usefulness of the information that it contains. Just send $10.00 to DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46 California, and a copy will be on its way to you the next day.

BREAK DOWNS need not be prolonged!

Illustration shows crankshaft from custom built pump in large Shortening and Soap Manufacturing Plant.
Original shaft failed in service and delivery time from factory was expressed in terms of **MONTHS!**
The broken shaft was received in our shops on MONDAY—drawings were prepared, work started and a complete new crankshaft—accurately machined from a solid forging—was ready for delivery the following **SATURDAY!**
Months of costly waiting reduced to SIX DAYS.



ANY PART DUPLICATED FROM THE OLD OR DAMAGED ONE, OR FROM A DRAWING

When not practical to ship us the old part and drawings are not available, our Engineers and Draftsmen will visit the location to prepare drawings and discuss repair procedures, when justifiable.

FAILURES OF OBSOLETE PARTS AND "OUT OF STOCK" ITEMS NEED NOT DELAY YOUR OPERATION.

CALL, WIRE OR WRITE

"KEEPING PACE WITH DIESEL PROGRESS"

WASHINGTON IRON WORKS, INC.

Established 1876

SHERMAN, TEXAS

West Coast Diesel News

By FRED M. BURT

FOR THE Tous Co. of Ecuador a new tuna-freezing plant at Christobel Island of the Galapagos group, designed, engineer and installed by A. L. McGowen of Los Angeles; three 9¼x9¼ Baker compressors driven by two 135-hp. Murphy diesels, v-belt connected, also two 60-kw. Murphy diesel-generating sets.

A NEW 125-ft. wood tuna clipper ordered by Joseph Rogers and associates from Martinolich Ship Building Co., San Diego, will have an 8-cyl., 800-hp. Enterprise diesel for propulsion; auxiliaries two 3-cyl. General Motors 125-kw. generating sets and a 165-hp. G.M. diesel connected to a 60-kw. generator.

INSTALLED on four 300-hp. Le Roix natural gas engines powering a Signal Oil & Gas Co., drilling rig, Huntington Beach, Engineering Controls Vapor Phase units, for cooling, saving about 100-hp., replacing radiators and fans; using a condensor and steam turbine with fan directed on condenser to aid in cooling.

FROM Engine Sales & Service, Los Angeles, a 165-hp. Murphy diesel for Ellis Construction Co., Los Angeles, to power a two-ton batcher in use on an asphalt road job in Inyo and Kern counties.

BUILT AT Mardesich Boat Yard, San Pedro, new 48-foot round-bottom purse seiner *American Beauty* with all-glued hull, is powered with a 165-hp. General Motors diesel.

THE LATEST addition to the power plant of San Manuel Copper Co., Tiger, Ariz., a 3,700-hp., Model LSV-16, super-charged, Cooper-Bessemer gas-diesel engine hooked to a 2,500-kw. G-E generator; supplementing three 1,500-hp. Cooper-Bessemers previously installed.

AS A SALES promotion aid in introducing the P & H marine diesels, Parker Diesel Engineering Co., Oakland, Northern California distributor, mounted a Model 387 P & H 68-hp. marine diesel on a truck to show fishermen in Eureka, Fort Bragg, San Francisco, Stockton and Sacramento.

PURCHASED by Winston Bros., four of the new single engine Euclid Scrapers powered with 275-hp. super-charged Cummins diesels; operating in earth moving at the new Whittier Narrows dam site, with two Caterpillar D8's for loading pushers, these units are each delivering about twelve cu.yd. loads per hour to a stock pile 1500 feet distant.

FOR THE San Jose (Calif.) sewage disposal plant, three 800-hp. dual-fuel Enterprise engines with Vapor Phase units for heat recovery, making steam for sludge treatment process.

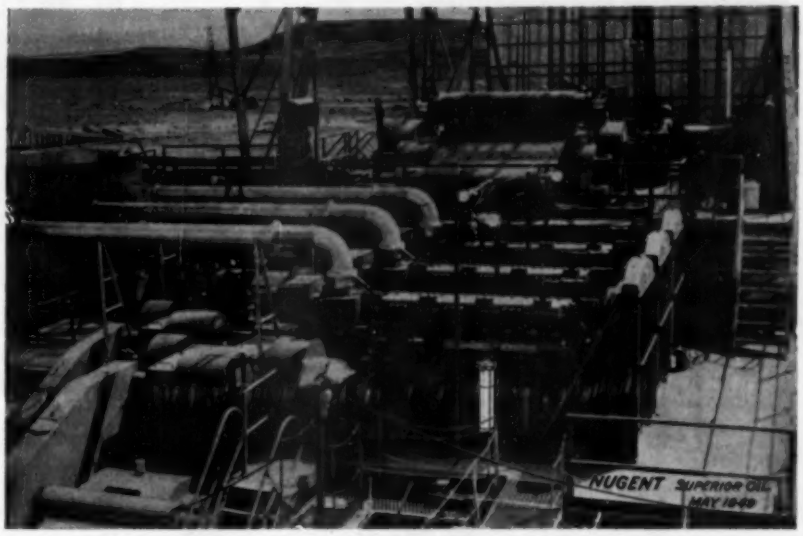
BUILT BY Birchfield Boiler Co., Tacoma, powered with a 90-hp. Washington diesel, a new shrimp trawler, 54-foot *Carmelita II*, sold to Ernesto DeCima, Guaymas, Mexico.

. . . and now please turn to page 93 . . .

Dependable

NUGENT FILTERS

really pay off here!



When you're making hole looking for oil, down time is a very expensive luxury. That's why Nugent Filters are used on so many drilling rig engines. The rig illustrated above is a good example — located in southwestern Wyoming at the time the photograph was made, the rig is one of the largest in the world. The three Superior supercharged dual-fuel engines deliver 2,010 combined horsepower and each is equipped with a Nugent depth type pressure lubricating oil filter.

It's in installations like this where efficient, dependable Nugent filtering pays the biggest dividends, but regardless of the type of installation, Nugent filters will pay for themselves in reduced oil consumption, longer equipment life and peace of mind.

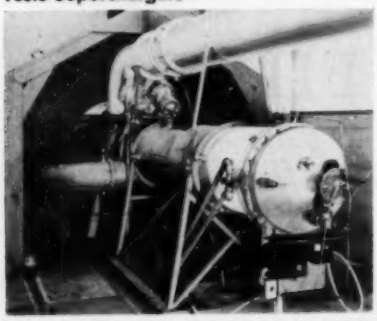
Write today for descriptive literature which tells how you can utilize all these Nugent advantages. An outline of your filtering problem will bring specific recommendations.

Wm. W. Nugent & Co., Inc.
415 N. Hermitage Ave. CHICAGO 22, ILLINOIS

OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS, OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS

Established 1897

Unique Cooper-Bessemer Rig Precision Tests Superchargers



A new development only recently put into operation at the Cooper-Bessemer Corporation's Mt. Vernon plant now makes possible complete performance tests of each exhaust-driven supercharger prior to installation on its engine. By means of the testing apparatus specially designed by this engine builder, each Cooper-Bessemer supercharger is performance run under conditions of loads and temperatures well in excess of those on the engine for which it has been built. More commonly referred to as a "boot strap" tester, Cooper-Bessemer's new rig makes provision for each supercharger to propel itself. In operation, air discharged from the supercharger's centrifugal compressor is directed through an oil fired combustion chamber. The heated air is then piped through the supercharger's gas turbine, driving in turn the same centrifugal compressor unit before being discharged into the atmosphere. Variations of load are, of course, determined by the amount of air discharged from the centrifugal compressor. Temperature is governed by the rate of combustion in the heating chamber. Thus any practical combination of operating temperature and load known to exist on a gas, diesel or dual-fuel engine can be quickly duplicated at little expense on the test floor. The design and construction of its own specially designed supercharger testing equipment marks another important phase of this engine builder's program in supercharger research, according to Lawrence F. Williams, assistant to president.

"Following the decision a little over a year ago to design and build its own superchargers in sizes not readily available from outside sources, it naturally became imperative that only the most modern and comprehensive test facilities be designed and built at once to insure maximum possible operating efficiency and dependability of our equipment," Mr. Williams goes on to explain. "As a consequence, the design of the 'boot strap' equipment was one of the first projects assigned to John Fulleman, internationally recognized authority on engine supercharging, who has been heading up Cooper-Bessemer's accelerated research and development program in engine supercharging." Installed in its own experimental building, the new Cooper-Bessemer "boot strap" equipment has complete facilities for remote control operation. Seated at the control panel in an adjoining room with visual and recording instruments conveniently located, the operator can see at a glance the progress of each test.

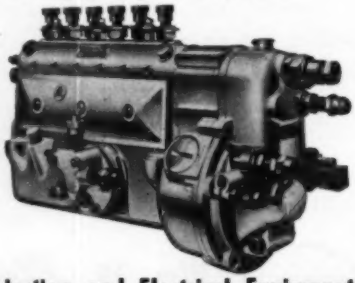
C.A.V. LIMITED SERVICE

Confidence Abroad

Transport operators all over the world have learnt to trust this sign.

In any language the letters on the C.A.V. sign stand for first-rate service facilities, maintained by highly-trained craftsmen, using special precision equipment.

Wherever vehicles fitted with C.A.V. Fuel Injection Equipment are exported — whether to Trondheim, Santiago, Hong-Kong or Sydney — there's a service agent or depot to give it the specialist attention needed for such high-precision equipment.



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14820 DETROIT AVENUE, CLEVELAND 7, OHIO

New OTC Flare Nut Wrenches

Two new Flare Nut Wrenches which increase the range of these popular tools to 1⅛ inches have been announced by the Owatonna Tool Company. These wrenches are ideal for fuel, hydraulic and gas lines on diesels, tractors, refrigeration units, etc. The wrenches are made with hex openings to provide a better bite and to prevent turning the corners on soft brass nuts usually found on copper lines. Drop-forged from high alloy steel, fully heat-treated with chrome plated finish. No. CS-2428 ¾ inch by ⅞ inch, No. CS-3236 1 inch by 1⅛ inch. Three other wrenches of the Flare Nut type, covering the smaller automotive sizes are also available. No. CS-1214 ⅝ inch by 7/16 inch, No. CS-1618 ⅛ inch by 9/16 inch, No. CS-2022 ⅝ inch by 11/16 inch. For further information contact your nearest OTC distributor, regarding Flare Nut Wrenches or write to the Owatonna Tool Company, 415 North Cedar Street, Owatonna, Minnesota.

DIESEL ENGINE CATALOG is just off the press in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 29.

ATLANTIC METAL HOSE
GUARDS
DIESEL LIFELINES
AIR · FUEL · WATER · EXHAUST

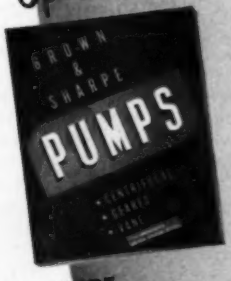
ATLANTIC flexible metal hose does a *better* job of controlling vibration of these vital lines and insuring their continuous, trouble free operation—because each section is *Job Tested and Guaranteed to Do Its Job!*

That's why more and more purchase requisitions read, "**Order from Atlantic for Every Diesel Need!**" Furnished in all workable metals, ¼" to 2" I.D. inclusive . . . with fittings as desired.

Write for Diesel Bulletins 1020 and 50A. • See our Catalog in Sweet's File for Product Designers

ATLANTIC
METAL HOSE CO., INC.
102 W. 64th St. · N. Y. 23, N. Y.

For Trouble-free Diesel Operation...

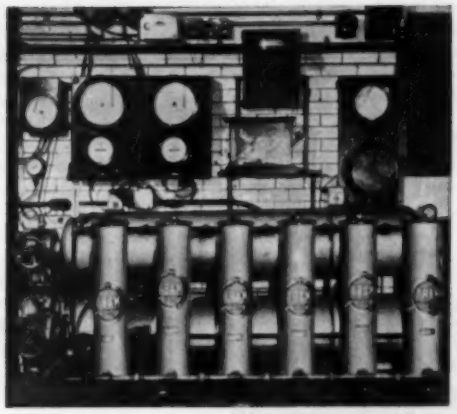


Send for a copy of this Catalog and see how many quality-built Brown & Sharpe Pumps are available for diesel use. A wide range of types and sizes in standard rotary geared pumps with various styles of special mountings greatly simplifies the right selection for the job. Have a catalog handy for quick reference. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

WIDE SELECTION PERMITS THE RIGHT CHOICE

We urge buying through the Distributor

BROWN & SHARPE BS



These six Fram Filters serve 840 h. p. Fried Krupp Diesel at large eastern university. This Diesel drives a 600 kw. Crocker-Wheeler generator.

University Cuts Maintenance Costs of Diesel Power Plant with FRAM Filters

Four Fram Filter installations filter dirt, grime, sludge and carbon from lubricating oil of 545 h.p., 630 h.p., 840 h.p. Fried Krupps and a 448 h.p. Baldwin in power house of large eastern university. Engineers consider Fram Filters the best . . . definitely a money-saver. Absolutely no maintenance except changing cartridges.

FRAM Filters Cut Diesel Downtime!

No matter what your Diesel oil filtering problem—either fuel or lube—Fram can help you conquer it. Fram's Research Department can determine the exact Fram Filcron Oil Filter you need to keep injectors clean and efficient . . . to keep vital moving parts free from engine-killing dirt, dust, grit, sludge and abrasives.

If you're interested in getting *top* efficiency, *top* performance from your Diesels, write for full information today to FRAM CORPORATION, Providence 16, R. I. *In Canada:* J. C. Adams Co., Ltd., Toronto, Ontario.

FRAM *Filcron*
THE MODERN OIL FILTER

New Manager for American Air Filter Company

Mr. John Hellstrom, vice president of the American Air Filter Company, Inc., Louisville, Kentucky, moved to San Francisco shortly before the end of 1950 to become manager of the newly created Pacific division. Under his direct supervision will be the business activities of both American Air Filter Company and its Herman Nelson division of Moline, Illinois, in the Pacific territory. The Pacific division includes the offices and representatives in the states of California, Oregon, Washington, Idaho, Montana, Utah, Arizona, New Mexico and the western part of Texas.

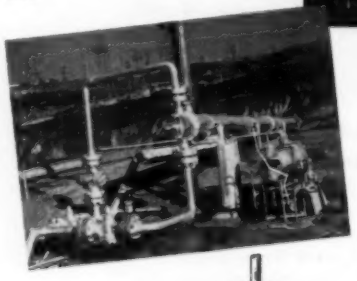
Mr. Hellstrom is one of the pioneers of air filtration and dust control. He was president of the Midwest Air Filters, Inc., up to the time it was merged with several other companies to form the American Air Filter Company, of which he became vice president in charge of the Dust and Fume Control Division. Starting with the Roto-Clone when it was an entirely new idea in dust collecting, he has, in the course of twenty years, built it into a dominant factor in this field. He was president of Foundry Equipment Manufacturers Association this past year and has been a director of F.E.M.A. for three years. One of his assistants will be Mr. Robert H. Walpole, Jr., who for the last four years has been engineering supervisor of the company's Dust and Fume Control Division, with headquarters in San Carlos, California. Mr. Hellstrom will headquarter in San Francisco, with offices in the Standard Oil Building, 225 Bush Street.

VAPOR PHASE Solves Pump Oil Heating Problem in Major Oil Field

—AND KEEPS THESE 11 GAS ENGINES AT CONSTANT PEAK OPERATING EFFICIENCY IN THIS KOBE OIL PUMPING SYSTEM POWER HOUSE.

ABOVE—This Vapor Phase unit eliminated need for costly cooling tower shown.

BELOW—Heat Exchanger and Condensate Hot Well served by Vapor Phase unit.



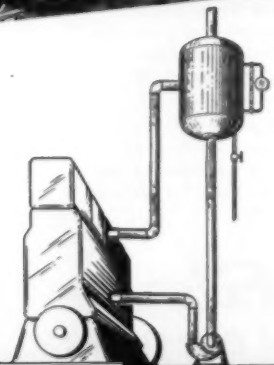
INCREDIBLE PERFORMANCE AND SAVINGS ACCRUED SOLVES OTHER OIL FIELD PROBLEMS, TOO!

In this major West Coast oil field, amazing Vapor Phase —a single unit—is "doing the impossible" and reducing operating costs to a ridiculously new low. Here Vapor Phase serves three vital functions:

1. Keeps a battery of 11 Twin City HUA Gas Engines (500 HP) at constant peak efficiency, with lowest fuel and lube oil consumption, and unaffected by ambient temperatures or conditions.

2. Provides steam at 10 psi 240°F.—1500 pph or 1,429,500 btu's per hour at full load—used to heat the Kobe System lifting oil. (Kobe oil at 3500 psi passes through heat exchanger tubes heated by steam. Condensate is automatically collected in hot well for return to Vapor Phase unit without loss.)

3. Eliminates costly cooling tower formerly used.



AND THAT'S NOT ALL!

Vapor Phase equipped engines *also* serve the multi-purpose job of generating steam, heating water, fluids, space or other process (including cooling or heating through air conditioning systems)—each as required or all at the same time, for the cost of engine operation *only*.

VAPOR PHASE pays off in Savings alone, the first year. The unit costs nothing to operate and is good for life.

STOP THROWING GOOD MONEY AWAY! WRITE OR WIRE FOR INFORMATION

Offices in Most Principal Cities

ENGINEERING CONTROLS, Inc.
2835 East Eleventh St., Los Angeles 23

Sales Engineer Appointed

Francis W. Cross

The appointment of Francis W. Cross as Sales Engineer, Heavy Machinery Division, is announced by R. W. Bayerlein, vice-president, Heavy Machinery Division, Nordberg Manufacturing Company, Milwaukee 7, Wisconsin. A graduate of Marquette University, Mr. Cross was United States Navy Department Coordinator of Plant Facilities, handling contracts involving machine tools and general plant equipment in the greater Milwaukee area during the war.

Falk Engineers

George P. Maurer

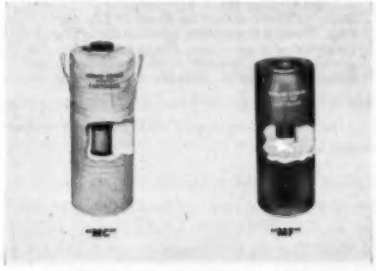
Louis W. Falk, executive engineer of the Falk Corporation, recently announced the promotions of seven members of the company's engineering department. George P. Maurer, a Falk employe for 24 years, has been named assistant chief engineer, gear technology. W. Stephen Richardson is the new assistant chief engineer, applications and special products. He has been with the company 13 years. Edward J. Wellauer, newly appointed assistant chief engineer, materials and research, has been with the company for 17 years. New responsibilities for engineering departmental operations will be assumed by Karl W. Johns, chief draftsman, parts and tooling; Henry W. Kayser, supervising engineer, development; Herman H. Klackner, supervising engineer, applications and special products; and Ralph W. Wilken, supervising engineer, open gears.

Oil Salesmen Helped

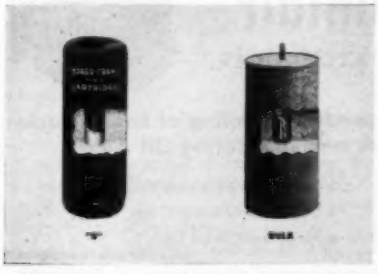
Oil salesmen throughout these United States, throughout the world for that matter, have found the DIESEL ENGINE CATALOG of great value to them in their field work. This possibly explains why 57 Socony-Vacuum field salesmen have spent $570.00 amongst themselves to buy this book. When a field salesman spends $10.00 for a book like DIESEL ENGINE CATALOG, he has to know that it is going to do the job for him. This book does. This is a hearty recommendation to every other oil company field salesman. Buy a copy of the DIESEL ENGINE CATALOG today. Send $10.00 to DIESEL PROGRESS, P.O. BOX 8458, Cole Station, Los Angeles 46, California, and the book will be on its way to you the next day.

Honan-Crane Cartridge Refills

Addition of the new low cost "S" type cartridge to a recently developed series of oil purification cartridge refills now enables Honan-Crane Corporation, Lebanon, Indiana, to offer a complete, economical selection of filtering mediums for the correct handling of *every* purification problem. Refill life and thorough oil purification with cartridges are effected through the use of Honan-Crane's purifying media, "Cranite" (specially processed fuller's earth) and "Palconia" (carefully blended cellulose fiber). Cranite and Palconia are available either in bulk or in three types of interchangeable cartridge refills, Types "MC," "MF" or the new "S" cartridge. Easy-to-handle refills remove either solids or product of oxidation or both—maintain any type of oil in approximately new condition, indefinitely.



"MC" cartridge is a woven cotton bag containing 15 pounds of Cranite, specially processed fuller's earth. Oil passes through 2½ inches of Cranite surrounding the center tube in addition to a layer of felt and a 250-mesh monel screen covering the center tube. "MC" provides complete purification, removing solids and abrasives as well as soluble products of oxidation such as asphaltenes, resins and acids. "MF" cartridge is a perforated metal basket lined with woven cotton sock material and uniformly packed with Palconia, cellulose filtering medium. Oil passes through cotton sock and 2½ inches of cellulose surrounding the center tube in addition to the felt center tube cover. Uniform porosity of filtering material insures even flow and efficient removal of solids, abrasives, scale and other foreign matter.



New "S" cartridge contains 4½ pounds of Palconia tightly packed in woven cotton sock material. Performance of this cartridge comparable to "MF" in removal of abrasives, scale, etc. Fiber center tube simplifies disposal of spent cartridge as entire unit is completely consumed by burning. Bulk Cranite in paper bags and Palconia in cartons is available for refilling Honan-Crane bulk and combination type purifiers. Performance equal to that of cartridges of same medium is characteristic of the bulk materials. For complete information on cartridge refills and descriptive bulletins covering Honan-Crane oil purification equipment for diesel lube and fuel oils, turbine oils, cutting oils, quench oils, coolants, etc., write, Honan-Crane Corporation.

Tries Diesel After 54 Years

After 54 years of steam, the Morristown & Erie Railroad, tried diesel. The railroad, once a busy passenger line, now makes a leisurely freight jaunt from Morristown to Essex Falls, New Jersey, a distance of slightly more than eleven miles. The only rolling stock owned by the railroad at the moment are three locomotives, the most recent one having been built in 1913, and two cabooses. Trying out the EMD diesel on a haul of 19 cars, Fletcher M. Williams, superintendent, said that the idea smacks of a "wonderful proposition."

DIESEL ENGINE CATALOG is just off the press in its Fifteenth Edition. Completely revised and up-to-date, it is invaluable to design engineers and buyers. ORDER COUPON ON PAGE 29.

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9 models 1–6 cylinders, 5/150 h.p. at 600/1000 r.p.m.
4 models 1–4 cylinders, 13/52 h.p. at 1500 r.p.m. (B.E.S.A. ratings.)
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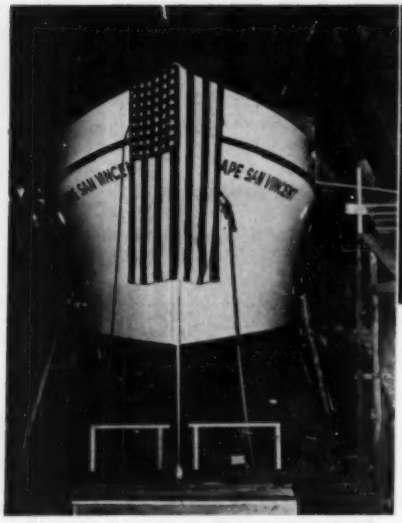

Launched at Tacoma Shipbuilding Co. during the latter part of 1950 was the new Tuna Clipper, *Cape San Vincent*. Designed by Arthur De Fever of Los Angeles for a California syndicate headed by Capt. Vincent Gann, the *Cape San Vincent* is a 91x24x12 foot clipper of moderate power and compact design. She packs a 400-hp. Enterprise diesel. Launching party, left to right: Haldor Dahl, vice president of Tacoma Boat; Architect Arthur De Fever, of Los Angeles; Capt. Vincent Gann; Mrs. Edmund Gann, daughter-in-law of Capt. Gann; Diana Lynn Gann, his grand-daughter, sponsor of the vessel; and Arne Strom, president of Tacoma Boatbuilding Co.

New Bus Orders for Mack

Two new bus orders, totaling 75 units, have recently been received by Mack-International Motor Truck Corporation, according to an announcement by J. H. Middlekamp, vice president and manager of the company's bus division. One order, for 50 Model C-50 buses, has been placed by the City of Cleveland. These buses, with a seating capacity of 50, will be powered by the Mack ENDS 672 supercharged diesel engine. They will be equipped with hydraulic steering and air brakes. Entrance doors will be 30 inches wide; extra-wide exit doors will offer a clear opening of 45 inches. The other order, specifying 25 Model C-45 buses, was received from the Portland (Ore.) Traction Company. These buses have a seating capacity of 45. They will be powered by the Mack END 672 diesel engine and will be equipped with hydraulic torque converter drive.

This is the second order the Portland Company has given Mack within a year. The first one called for 25 C-45 diesels and 7 C-37 diesels. Delivery of those 32 units made possible the retirement of the last street cars operating on Portland's streets. With the delivery of this present order, which represents another step in the modernization and expansion of the Portland Traction Company's system, the city will have 420 Mack buses in service. Both the Cleveland and Portland buses will be built with the standard Mack Fortress Frame and will be equipped with the company's own Evenflow heating and ventilating system.

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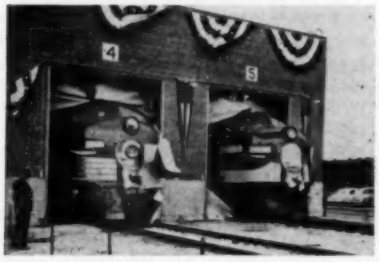
Cooper-Bessemer Chief Metallurgist Reports on Nodular Iron

The time is not far off when such items as high-pressure compressor cylinders, supercharged diesel engine crankshafts, pistons and other parts subject to severe mechanical service will be produced from the new nodular iron, according to T. E. Eagan, Chief Metallurgist of the Cooper-Bessemer Corporation. Many highly stressed engine and compressor parts which have heretofore been produced from more costly cast steels or steel forgings can now be successfully made from nodular iron, explained Mr. Eagan. With the high tensile properties as well as the ductility being developed in nodular iron, it is apparent that this new material will in the future gain widespread use in all industries where high pressures are encountered. Wide interest has been focused on Mr. Eagan's work. Mr. Eagan stated that while there is considerable development work to be done in perfecting melting techniques and casting proceedures, basic data already gathered confirms initial promise that nodular iron is a better material than mild cast steel for many castings of intricate design. He disclosed that nodular iron is now being produced possessing tensile strength exceeding 90,000 psi. Ductility is averaging ten times that possible with cast iron. Fatigue tests conducted on high pressure cylinders are demonstrating that nodular iron equals and in many cases exceeds the fatigue endurance that can normally be carried with mild cast steel. Mr. Eagan, in addition to his duties with Cooper-Bessemer, is also a director of the American Foundrymen's Society.

New Frisco Railway Diesel Shops



Plans for building a $300,000 addition to the Frisco Railway's new diesel shop at Springfield, Mo., were announced by Frisco President Clark Hungerford at the formal dedication of the new multi-million dollar Springfield facilities. Climaxed by two Frisco diesels bursting through a paper barrier, the dedication took place before a crowd of 1000 persons in front of the new shops. It was part of Springfield's observance of "Frisco Day" in which the town paid tribute to the railroad which played an important part in its growth. Although the new diesel shops were completed only last spring, the fast-growing Frisco diesel fleet has already outgrown the facilities, Mr. Hungerford explained in announcing the plans for the addition. The new project will add four more tracks, two of them with servicing pits in a 95 by 249 foot addition. The present shops have five tracks, three with servicing pits and can handle 131 diesel units. Tracks in the addition will have a capacity of four units each.

EMD Appointments

Harold H. Dice — John H. Anderson

The appointment of Mr. Harold H. Dice to the post of Administrative Assistant of Electro-Motive Division of General Motors has been announced by Mr. B. A. Dollens, general manager. Mr. Dice has been director of test and inspection since 1946. In his new position, he will report directly to the general manager and will be responsible for activities relating to manufacturing, engineering, production control, purchasing and inspection. Mr. Dollens also announced the appointment of Mr. John H. Anderson to succeed Mr. Dice as director of test and inspection. Mr. Anderson has been assistant director of test and inspection since February, 1949.

Argentina Buys 30 G.E. Diesels

The Argentina National Railways has purchased 30 diesel-electric locomotives from the International General Electric Company, it was announced recently. The order, amounting to $7,500,000, is the second for General Electric diesel-electric locomotives since 1947. Deliveries will start in 1952.

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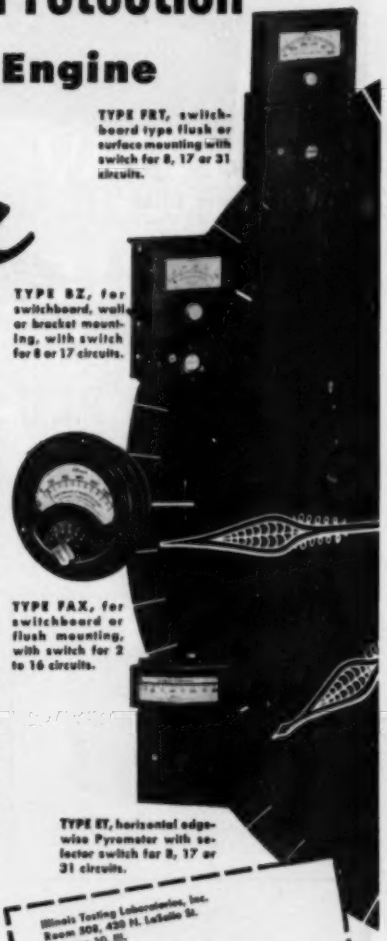

TYPE FRT, switchboard type flush or surface mounting with switch for 8, 17 or 31 circuits.

TYPE BZ, for switchboard, wall or bracket mounting, with switch for 8 or 17 circuits.

TYPE FAX, for switchboard or flush mounting, with switch for 2 to 16 circuits.

TYPE ET, horizontal edgewise Pyrometer with selector switch for 8, 17 or 31 circuits.

Every day that brings more material shortages makes your present diesel more valuable. Parts may soon be hard to get, and breakdowns will be more costly. Under such conditions, your diesel should have the ultimate in protection. Alnor precision-built pyrometers bring you round-the-clock protection . . . assure first-rate engine performance . . . first-rate profits. Alnor pyrometers give an instant check on individual exhaust temperatures, anticipate trouble from pre-ignition, detonation, overloading or breakdown of lubrication. Such continuous protection reduces maintenance time and expense to a minimum—increases efficiency and operating economy. That's the type of protection so many diesel manufacturers are seeking when they specify Alnor pyrometers as original equipment. Ask your Alnor representative now about these rugged, low-cost instruments. He'll be glad to help you choose the type of Alnor pyrometer and thermocouple exactly suited to your requirements. In the meantime, send for bulletin 4361, describing the complete pyrometer line—use this handy coupon.

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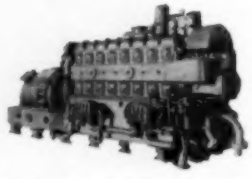
200 K.W. G.M. 8-268A DIESEL GENERATOR SET



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- Duty — Continuous
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- Method of cooling — Self ventilated

D.C. EXCITER — WESTINGHOUSE

- Voltage — 120 volts
- Amperes — 333

ENGINE — G.M. 8-268A — 8 CYLINDERS

- Nominal H.P.—450
- Bore—6½"
- Speed—1200 r.p.m.
- Air starting
- Stroke 7"
- Cooling—heat exchanger

WEIGHT OF GENERATOR SET — 16,705 LBS.

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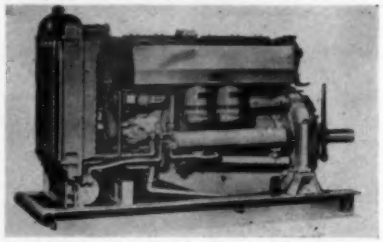
Murphy Offers New Line



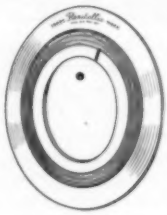
A new line of heavy duty diesel engines has recently been announced by the Murphy Diesel Company. The new line consists of six models from 145 hp. to 220 hp. They are designed to operate at continuous speeds up to 1,400 rpm. This higher operating speed will make possible the application of Murphy diesels in new services including those requiring torque converter power transmission. The well known Murphy design features such as unit fuel injection, four valves per cylinder hydraulic servo-type governor, etc., will remain as the basis of the new line. Full details including specification sheet are available from Murphy Diesel Company, 5355 W. Burnham St., Milwaukee 14, Wisconsin.

Appointed General Sales Manager

George H. Lynn

George H. Lynn has been appointed general sales manager of the Hamilton Division, Baldwin-Lima-Hamilton Corporation, Hamilton, Ohio. In his new capacity he will be in charge of sales of machine tools, can machinery, diesel engines and special equipment. His offices will be in Hamilton. Mr. Lynn joined Lima-Hamilton Corporation in 1947 as western district manager in Chicago for Niles Tool Works Division and Hooven, Owens, Rentschler Division of the company. He held this position until taking over the new appointment in the Hamilton Division.

New High-Pressure Gasket



A new high-pressure gasket streamlines jointed connections, reduces turbulence in the piping and increases flow of fluid. Flexitallic Gasket Co. reports that this new gasket is a compression gauge type with both an inside and outside ring. It has a spiral-wound construction with alternating V-crimped plies of metal and filler. In every pipe there is a certain amount of skin friction which sets up little eddies in the fluid passing through. At the joint, this friction is increased as the fluid pushes into the recess between flanges. With the new Flexitallic Gasket, the steel ring practically fills the flange recess so that no turbulent barrier is set up. Flow is increased. For all practical purposes, the inside ring converts one of a pair of smooth face flanges to a groove flange, providing all the safety of a wholly contained gasket without the expense of machining a flange.

The inside ring also provides a compression gauge which supplements the outside ring. It prevents radial movement of the gasket under extremely high bolt loads and minimizes gasket contamination from highly corrosive fluids.

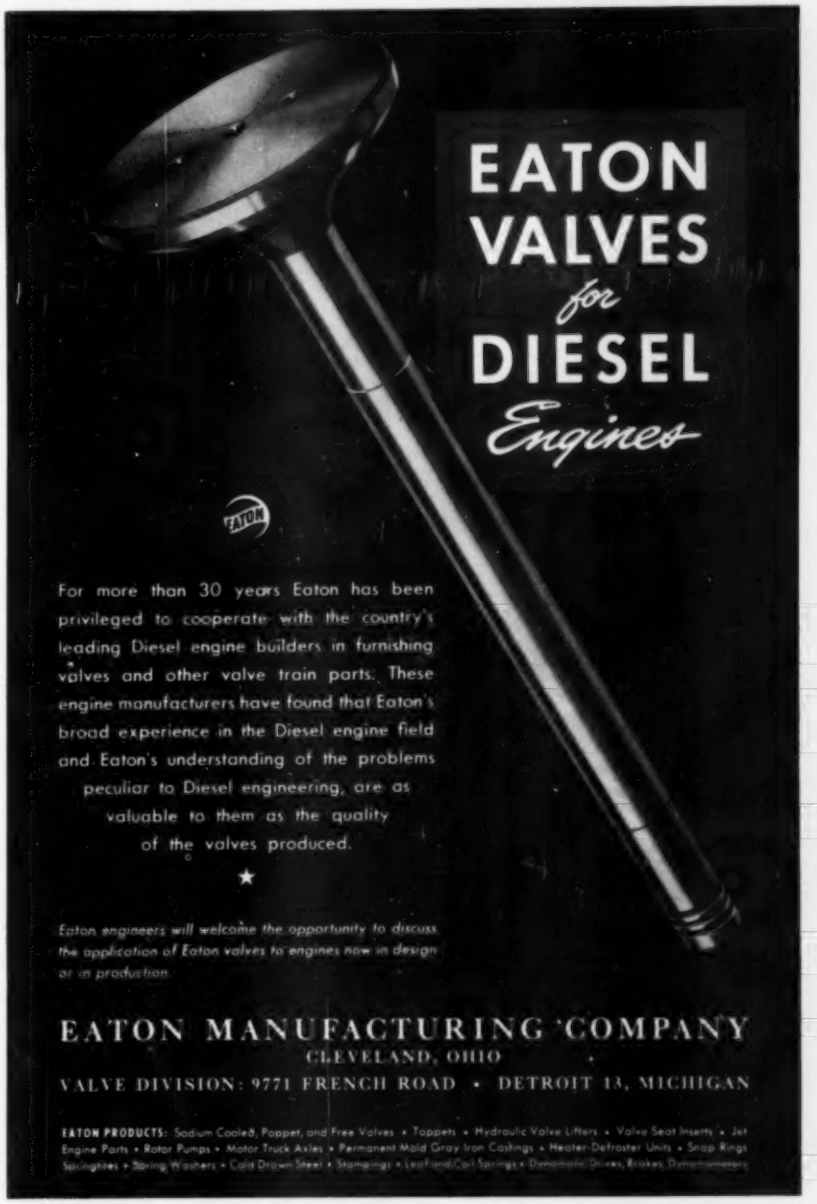
The new style gasket is made for practically all standard A.S.A. and A.P.I. fittings as well as special designs. Pressure range is 150 to 2,500 lbs. In addition to stainless steels, the inside ring can be made with other premium metals such as monel, nickel or inconel. Ring thickness depends on flange face finish, as well as the yield factors of the gasket proper. The gasket is designed so that the inside ring can be conveniently remounted in new replacement gaskets as an economy measure. The inside ring is also being used with the self-centering type of gaskets made by Flexitallic for raised face, smooth face, vanstone and lapped joints, as well as with the Flexitallic gasket for large male and female joints. A wide choice of metals and filler materials are available, including teflon. Further information may be had by writing DIESEL PROGRESS, File 73, P. O. Box 8458, Los Angeles 46, California.

DEMA Meeting

The annual meeting of the Diesel Engine Manufacturers Association was a three-day session held in Chicago on December 12, 13 and 14. At that meeting, the following officers and directors were elected to guide the aairs of the Association for 1951: president, Otto H. Fischer, president of the Union Diesel Co., Oakland, California; vice-president, A. W. McKinney, executive vice-president of the National Supply Company, Toledo; vice-president, Marvin W. Smith, president of Baldwin-Lima-Hamilton Corporation, Philadelphia; treasurer, Robert H. Morse, Jr., president of Fairbanks, Morse & Co., Chicago. Directors: William E. Butts, president of the Enterprise Division of General Metals Corporation, San Francisco; Levin H. Campbell, Jr., executive vice-president of International Harvester Company, Chicago; C. Paul Clark, president of Clark Bros. Co., Inc., Olean, New York; George W. Codrington, vice-president of General Motors Corporation, Cleveland; M. C. Davison, vice-president of Ingersoll-Rand Company, New York; Robert E. Friend, president of Nordberg Manufacturing Company, Milwaukee; Gordon Lefebvre, president of The Cooper-Bessemer Corporation, Mt. Vernon, Ohio; William S. Morris, vice-president of American Locomotive Company, New York; E. J. Schwanhausser, executive vice-president of Worthington Pump and Machinery Corporation, Harrison, New Jersey. Harvey T. Hill was reappointed executive director of the Association.

During the three-day meeting, the following were some of the topics discussed: Revision of the Association's 1946 edition of "Standard Practices for Low and Medium Speed Stationary Diesel Engines," for publication 1951; the need for a universal single cylinder test engine for mechanical engineering schools; the Association's educational program; the work of the ASTM Sectional Committee Z11 on Petroleum Products and Lubricants; and the Texas Company's research work on crankcase explosions. Panel discussions were held on the subjects of diesel fuel and diesel lubricating oil and on diesel engine governors, with representatives of the research divisions of the oil companies and representatives of the governor manufacturing companies participating. Panels were also held on the subjects of diesel engine filters and on diesel engine cooling, with the chief engineers of the diesel manufacturers participating. Presiding over these four panels were Ralph L. Boyer, vice-president and chief engineer of the Cooper-Bessemer Corporation, Ervin L. Dahlund, chief engineer of the Diesel Division of Fairbanks, Morse & Co., John H. Sheusner, chief engineer of the Enterprise Division of General Metals Corporation, and George Steven, executive engineer of Worthington Pump and Machinery Corporation, respectively.

At a dinner meeting on December 13, Harlan W. Nelson, supervisor of Fuels Research at Battelle Memorial Institute, and Elmer R. Kaiser, assistant director of research for Bituminous Coal Research, Inc., gave a report on the status of the project being carried on at Battelle Memorial Institute for improving gas producers using bituminous coal, which project is under the joint sponsorship of certain members of the Diesel Engine Manufacturers Association and a number of other interested organizations. The high-light of the annual meeting luncheon on December 14 was a talk by Mr. John L. McCaffrey, president of International Harvester Company on "Selling Your Company to Your Employees."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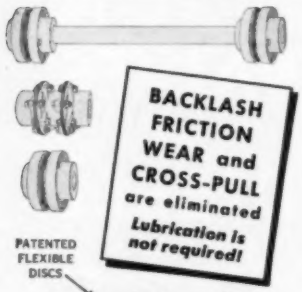

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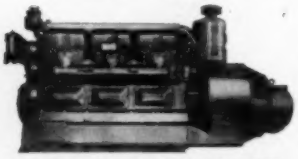

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"Vitamin" Capsules Provides Summer Starting in Winter For Your Diesel Equipment

It may never get down to 50 below in your neck of the woods. But if the mercury plummets to the bottom, just give your engine a dose of vitamins—Chevron Starting Fluid—and you'll be treated to mid-summer action. Cold weather can be serious business for drivers of diesel equipment. Starting after vehicles have been outdoors all night, was a heavy chore, and an expensive one too. Now that phase of winter operation has been licked. The solution traces right back to the Army's construction of the Alcan Highway during the war. Aptly named vitamin pills for engines, they are products of war necessities. The Army was faced with the problem of keeping automotive equipment—both diesel and gasoline—running in Alaskan winter temperatures that can range down to 79 degrees below zero, Fahrenheit.

Operator placing a "vitamin" capsule in the tool which can be mounted at any convenient spot.

Research men from Standard Oil Company of California were invited to Alaska to study the problem. That resulted in the development of Chevron Starting Fluid. The capsule containers are a later improvement. During the war, both hand operated spray guns and auxiliary tank systems were used to get the fluid into the combustion chambers. After D-day, better and safer methods of using this starting fluid were worked out. The gelatine capsules containing fixed amount of the fluid were the first step. They were perfected by C. J. Moody, vice-president of the California Oil Company. Production of the fluidcontaining capsules was turned over to the Gelatine Products Division of the R. P. Shearer Corporation of Detroit, specialists in the field of capsule packaging. It works with a priming system that is permanently connected to the intake manifold of engines such as those used in diesel equipment. Now all the operator does is place a capsule in the tool, puncture it by pressing down the plunger and then prime the engine before he steps on the starter. The system has been designed with one to three injection nozzles so that it is adaptable to all internal combustion engine types and sizes. Everyone who operates motor vehicles under winter conditions has been up against starting trouble. If it were practicable to house all automotive equipment in heated buildings when the engines are idle, there would be no problem. But, that just isn't feasible. Various special formulas for easier cold weather starting have been tried. None really solved the problem until research worked out a sure-fire formula and devised simple methods of packaging and using it.

After the top is replaced, pressing down on the plunger releases the starting fluid.

Starting heavy automotive power units on regular fuels becomes mighty difficult when temperatures drop. The freezing point is the critical spot for diesel engines. Gasoline engines need starting help when the mercury gets below zero Fahrenheit. The reason in the case of diesels is that temperatures at the end of compression are too low to ignite regular fuel. In gasoline engines regular fuel will not vaporize sufficiently to ignite, even though the spark is more than hot enough. In tests, the use of Chevron Starting Fluid capsules showed the advantages of the new method. At minus 40 degrees Fahrenheit, a typical automotive diesel engine started in ten second when Chevron Fluid was used. Under the same conditions, but using conventional cold weather methods, it took two hours to start the engine. That meant manpower loss and much wear and tear on the engine, much more expensive than the pennies needed for the necessary starting fluids. Capsules are cheap. Those holding 7 ccs. of fluid cost a dime. The larger 17 cc. size costs 20 cents.

The reason why Chevron Starting Fluid has ability to start cold engines that won't start on their normal fuel is because the automotive ignition temperaure of the fluid is approximately 370°F. as compared to 1,000°F. for gasoline and 600°F. for diesel fuel. Other advantages, due to quicker starting and special additives in the fluid, are minimizing of engine wear, corrosion inhibition and the low freezing point, about minus 70°F. Though it is a very new product, manufacturers of more than 90 per cent of high speed diesel engines —or of equipment powered by these engines—have approved Chevron Starting Fluid and the capsule method of application. Many of them are installing the priming system in factory production. Capsules and applicator kits are available through the marketing network of the California Oil Company —its parent, the Standard Oil Company of California and other affiliated companies.

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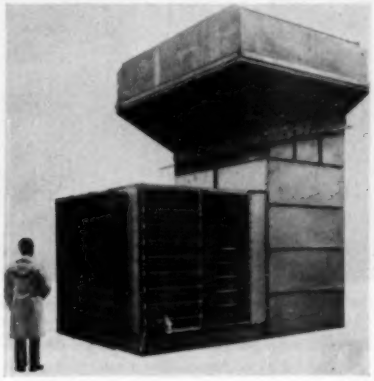
New Cooling and Heating Assembly for the Armed Services

An unusual cooling system with equipment for warming the room contiguous to the unit in the building in which it is installed is being manufactured by the Young Radiator Company for the Armed Services. The unit is built of all copper above the flashings, galvanized iron and hot dipped galvanized sections below. Close cooperation between their research and engineering departments and the manufacturing group facilitated original completion of the project within the time limit allowed by the Armed Services.



The structure is a combination of balanced-out factors. It is designed to be installed in a standard sized building with the top section, that above the flashing, projecting above the roof. Cooling air flow may be drawn from outside or inside of the building and is controlled by interlocking dampers with thermostatic air operated control. Cooling air discharge to the atmosphere through the ventilator or to the inside of the building is also controlled by interlocking dampers which are manually regulated and air operated. The automatically controlled shutters on the top of the ventilator assures that hurricanes or directional winds will not enter the building. Fresh air is drawn in through the shutters adjacent to the figure shown in the illustration above. The room air is drawn in through the shutters to the right, on the side, and either exhausted straight out through the ventilator or recirculated through the radiator into the room in which the unit is set. The long oblong section immediately right of the shutters is the "business" part. It houses the Young Engine Jacket Cooler Model 175. The structure is a big unit, measuring about 19 feet from its base to the top, about 16 feet from front to back and about 11 feet in width. The total weight is approximately 7,900 pounds. The net Jacket Water Cooler weight is 2,125 pounds.

Assistant Sales Manager Named

William E. McCoy, Camden, N. J., has been named assistant sales manager of the Central Division of Caterpillar Tractor Co., San Leandro, California, and Peoria, Illinois. He joined the company in 1939 as a college graduate trainee. McCoy succeeds Herman Eberling, who recently went on active duty as a captain in the U. S. Corps of Engineers.

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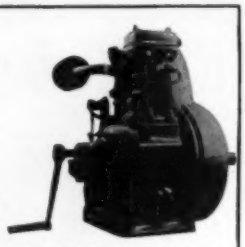

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EDUCATIONAL SYMPOSIUM AND TOUR SPONSORED BY DEMA

Eastern engineering college and university men get first-hand contact with diesel engineering design and maintenance problems as they may affect graduates interested in entering the diesel industry.

THE long period now required to train engineering graduates for diesel engineering design would be considerably reduced if engineering colleges and universities could give more attention to certain of the practical problems facing the industry today, it was emphasized by C. F. Pervier, manager, Diesel Engine Engineering, Baldwin-Lima-Hamilton Corporation, in a recent educational symposium sponsored by the Diesel Engine Manufacturers Association. From one to five representatives of more than a dozen engineering colleges in the east were guests of Baldwin-Lima-Hamilton Corporation for the symposium and tour of the plant at Eddystone, Pa. Although students usually come out of engineering schools well equipped in their basic understanding of engineering fundamentals, Mr. Pervier said, they should also be prepared for the shock of facing the serious problems that the diesel industry is struggling to solve, problems not presented in textbooks.

As an example of the type of problem which might be handled without adding more equipment than is presently in use in most colleges, he suggested that students actually make necessary design changes in an existing proven engine to increase its output above its normal rating. Thinking along these lines would give student engineers a better insight into the problems that they will encounter when they begin working in their chosen field. A leading problem today is the demand for maximum interchangeabality of parts with existing equipment. "In simple language, we must increase the output of the existing designs with a minimum of design changes." In accomplishing this, engineers are faced with many problems including severe scuffing, seizing of pistons and rings, burning of piston crowns, higher wear rates, short life, highly loaded parts and bearings, and therman and lubrication problems that previously never existed. To solve the problems and maintain interchangeability of parts has many discouragements, Mr. Pervier said, especially in railroad service, perhaps the severest duty for diesel power today.

The maintenance problem for diesel locomotives

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Two (2) Diesel Engine Generating Units consisting of two Busch-Sulzer Bros. Type 4B60, 250 B.H.P., 257 R.P.M., 4-cylinder diesel engines each direct connected to General Electric, 210 K.V.A., 168 K.W.,2300-volt, 60-cycle, three-phase generator and belt driven General Electric, 125-volt, 9 K.W., 1150 R.P.M. exciter.

These units were in service until moved to make room for two larger Busch-Sulzer Bros. Diesel Engine Generating Units.

Units may be examined at power plant in Opelousas, Louisiana.

For Further information write James Prados, Superintendent, Municipal Light & Water Plant, 417 N. Railroad Ave., Opelousas, Louisiana.

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was discussed by R. P. Johnson, general manager, Service Department of Baldwin-Lima-Hamilton Corporation. The difference in requirements in maintaining steam and diesel locomotives was pointed out as the chief source of difficulties, along with inadequacies of maintenance shops and personnel. These conditions, however, he said, are fast disappearing. Four ways of instructing railroad men in proper maintenance of diesel locomotives were outlined. Service engineers are placed at points of delivery until the men can operate and maintain them properly. Second, service engineers are permanently located at strategic points in order to keep railroad men up-to-date. Third, maintenance manuals are designed to be complete in all details of adjustment, operation and maintenance. Fourth, training of railroad personnel is taken to them rather than given in a plant school. Panels with mounted circuits, projectors for slides and charts, and other demonstration equipment is used in the field, often in the railroads' own instruction cars.

Among those who addressed the group were Harvey T. Hill, executive director of DEMA, and R. L. Stanley, educational director of DEMA who spoke on the educational opportunities in summer school and possible thesis subjects. Other Baldwin-Lima-Hamilton speakers were J. S. Newton, vice-president, Engineering, who welcomed the group and spoke briefly on the variety of products produced by the Eddystone division; D. R. Staples, manager of Locomotive Engineering, who gave a general description of the various types, applications and construction of diesel-electric locomotives included in the Baldwin line; and F. G. Tatnall, manager of Testing Research, who discussed the application and use of resistance wire strain gages.

Cooper-Bessemer Directors Elect C. G. Cooper Vice-President

Charles G. Cooper

Charles G. Cooper, manager of Cooper-Bessemer's Washington office, was elected a vice-president at the recent board of directors' meeting. "Mr. Cooper's election to vice-presidency," explained Mr. B. B. Williams, board chairman, "is partially in recognition of his important role of directing Cooper-Bessemer's efforts in this nation's defense program from the company's Washington office." Elected a director in 1945, Mr. Cooper has been responsible for the sales and servicing of government diesel and gas engine contracts as well as all direct relations between Cooper-Bessemer and agencies of the U. S. government. Son of the late C. G. Cooper, former Cooper-Bessemer president, and a grandson of Elias Cooper, one of the company's founders, Mr. Cooper is a graduate of the Sheffield Scientific School of Yale University, 1926.

West Coast News

. . . continued from page 81 . . .

being equipped with an Engineering Controls Vapor Phase unit; the low pressure steam recovered from waste heat will be used for heating fuel oil, water for potash processes, and for space heaters in the building. It is alongside at 500-hp. Worthington diesel similarly equipped.

ARTHUR DE FEVER, well known naval architect, formerly associated with the firm of Wilvers and De Fever (naval architects and marine surveyors of San Pedro and San Diego), as a partner, announced in December, the opening of his offices at the Johnson Western Building in San Pedro, Calif. A San Diego office will also be opened.

TWO 105-foot sister tuna clippers under construction by Puget Sound Boat Building Co., for Antonio Rosa and for John Cardosa will be powered with 600-hp. Enterprise diesels.

OWNED BY Al La Rocca, San Francisco, combination boats re-powered with Caterpillar diesels purchased from Brizard-Mathews Machinery Co., Eureka, Calif.: *Accursio LaRocca* with 38-hp. D311 and Twin Disc 3:1 reverse and reduction gear; *Crab Queen*, 80-hp. D318 and Twin Disc 2:1.

RE-POWERED by Shepherd Diesel Marine, San Diego, Nick Delaney's *Linda Jo*, with 38-hp. Caterpillar diesel and 3:1 Twin Disc reduction and clutch.

SOLD TO Harbor Boat Building Co., San Diego, by Crofton Diesel Engine Co., for use in fishing boat under construction, two 100-kw. diesel-generating sets, with Model 610, 250-hp. General Motors diesels.

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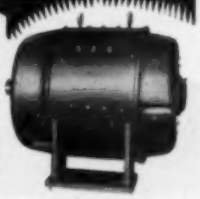

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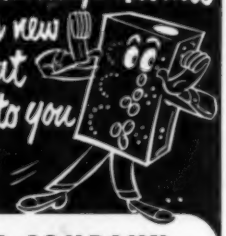

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SERVING THE NATION — FROM ITS CENTER

Diesels in Saudi Arabia

Pitiless desert heat, everpresent gritty sand, stinging flies and local unfamiliarity with the equipment all had to be surmounted before the first test engine proved under actual operating conditions that it would successfully pilot one of the largest single peacetime diesel engine contracts ever awarded. A total of forty Worthington diesel engines are involved in the Trans-Arabian Pipeline extending across the desert of Saudi Arabia from Abqaiq on the Persian Gulf to Sidon on the Mediterranean Sea. Twenty-five of the units are 8-cylinder engines, each driving at 1710 hp. a centrifugal pipeline pump through speed increasing gears. Fifteen 6-cylinder engines drive a 900 kw. electric generator each. All engines are supercharged vertical 4-cycle units. The 8-cylinder engines have a bore of 16 inches, a stroke of 20 inches, 350 rpm., and 120 bmep. The 6-cylinder engines have a bore of 16 inches, a stroke of 20 inches, 360 rpm., 1320 bhp., and 120 bmep.

The new pipeline chops off 3,600 tanker miles from the rich Persian Gulf area, which holds 42% of the world's known oil reserves, to western markets in Europe and America. One of the six stations, at Abqaiq, on the coast, will be powered by steam turbines. Steam at this pumping station is required to stabilize the crude oil. The remaining five stations, all remote from large water supplies, are equipped with Worthington diesels fueled by crude oil bled from the line, settled and filtered. The amount of crude fuel oil consumed by each engine – about 1500 to 2000 gallons per day – is insignificant when the amount of oil handled by the pipeline is considered. Operating at full capacity, the six stations deliver a total of 13,230,000 gallons a day. The pipeline transports he oil at the rate of four feet per second. With the exceptions of steam-driven Abqaiq and the number 6 station at Turaif where there are four engines, a total of five engines are installed at each of the other four stations for driving the pumps. Four pumps are used in series with approximately a 210 pound differential per stage, totaling about 840 psi. discharge pressure. There is one spare unit.

Each station is roughly 180 miles from its nearest neighbor and must therefore be a veritable community in itself. About 500 individuals are employed at each of the stations at the present time but eventually 200 to 300 persons will be sufficient to maintain normal operation – ninety per cent of whom will be Saudi Arabs. The electrical requirements of these five station communities is considerably more, per capita, than the average industrial-residential town in the U.S.A. The output of the two generators in regular service in each station is 1800 kw. One 900 kw. unit is a spare. All fifteen generators are driven by Worthington diesel engines. The electric power in the pipeline station communities serves not only the heavy industrial equipment in each area, such as auxiliary booster pumps, machine shops, welding equipment, garages, but also serves an usually large residential load and takes care of a modern outdoor lighting system, a clubhouse for recreation, entertainment, church services and a swimming pool.

Burgess-Manning Co. Cites Production Costs in Price Rise

New price schedule on exhaust snubbers and combination air and intake snubbers, was announced recently by the Burgess-Manning Co. Dudley W. Day, director of marketing, said standard exhaust snubbers were advanced approximately 10 per cent and SDF and SDF-L combination air intake cleaner snubbers have been re-priced based on experience with this new line, which has found such wide acceptance.

The new schedule results from increased production cost and went into effect Nov. 13. The schedule also brings the prices on the SDG Series with the side inlet feature in agreement with the popular SDG Series, thus effecting substantial savings to users of this product with the side inlet feature. Standard exhaust snubbers are designed to prevent exhaust noises from internal combustion engines, rotary and piston type vacuum engines and steam reduction systems by removing the cause of noise before it occurs. They also prevent line surge and vibration in sewage treatment plants and similar installations. Intake snubbers prevent air intake noise of internal combustion engines and blowers, and reciprocating compressors.

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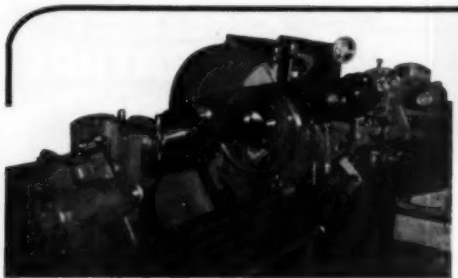

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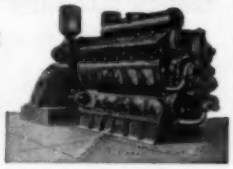

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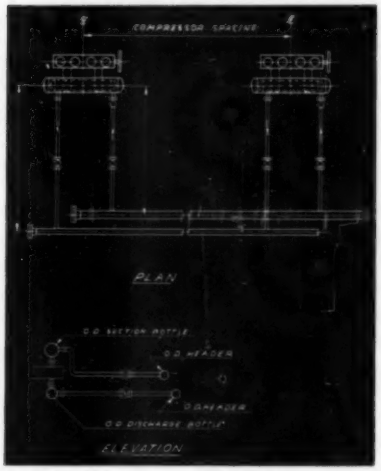
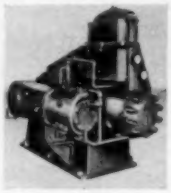
New "Pulse-Free' Piping System for Reciprocating Type Compressors

A new Pulsation Dampening Piping System is now being offered by The Fluor Corporation, Ltd. It is a complete compressor piping system which attenuates objectionable peak pressures caused by the reciprocating action of compressors, to permit a smooth, steady flow of compressed gas through the system. Design and engineering of the patented Fluor Pulsation Dampening Piping System is predicated upon bottles, laterals and headers being scientifically related to provide the appropriate components of acoustical filters, he basic principle of the Fluor "package-type" Pulsation Dampener. This Pulsation Dampening principle is an integral part of the system and involves no radical departure from the physical appearance of conventional compressor piping except for reducing the number of extraneous devices required to anchor piping.



The Fluor Pulsation Dampening, Piping System is guaranteed to provide a smooth, steady gas flow with minimum pressure drop. The initial advantage of the system in new construction is that it enables the operator to design and specify related equipment based on a piping system free of pulsative gas flow and its attendant problems. Other important considerations are the increased safety possible through elimination of vibrational stress on piping, heat exchangers and vessels; increased compressor operating efficiency by virtue of handling uniform gas loads; a reduction in metering inaccuracies. Copy of bulletin describing this system may be obtained by writing to DIESEL PROGRESS FILE 78, Box 8458, Los Angeles 46, Cal.

New Gas Compressor Unit



A new unit for compressing natural gas or for use in the liquified petroleum industry or other industry requiring gas under high pressure is announced by the White-Roth Machine Company. Designated by the manufacturer as the Lorain Model A-9 Compressor, the new unit is powered by a Lorain Model A multi-fuel engine. The single stage compressor is driven through an overhung crankshaft. This arangement reduces the 13-inch engine stroke to a 9-inch compressor stroke for high pressure work and matches the compressor characteristics to engine horsepower output. The compressor cylinder has bottom discharge to prevent accumulation of gas condensates and is equipped with full force-feed lubrication including lubrication of the metallic rod packings. This compressor is now in quantity production and available for domestic or export markets. The unit weighs 11,100 pounds with standard accesories. Full engineering specifications and performance data are available on request to the White-Roth Machine Corporation, Lorain, Ohio.

Sales and Engineering Appointment

Otto A. Bossart

The appointment of Otto A. Bossart as Sales and Engineering representive for the Contract Products Division of the Young Radiator Company has been announced by John J. Hilt, vice-president. Mr. Bossart, a graduate of the University of Wisconsin, has been a member of the Milwaukee Chapter of the Society of Automotive Engineers since 1941.

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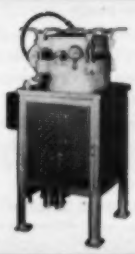

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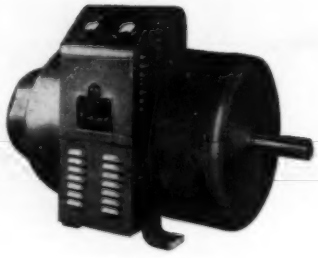

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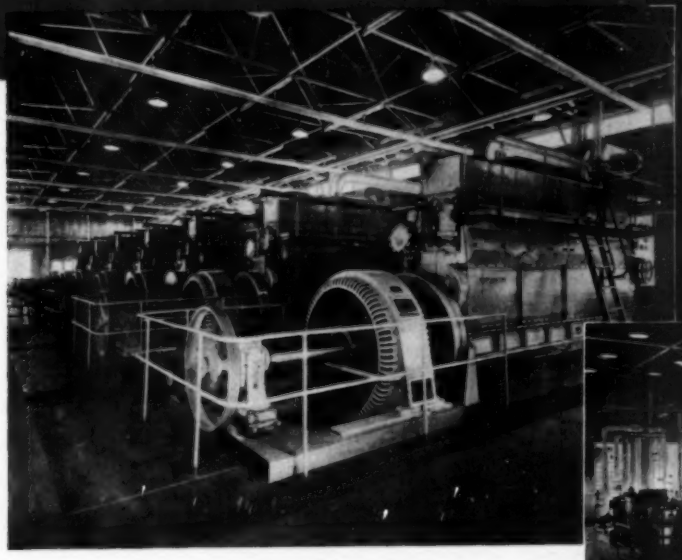
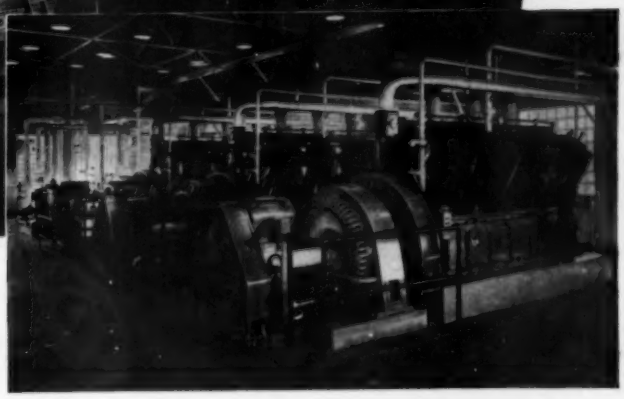
Two more new plants select...

ELLIOTT
FABRI-STEEL
GENERATORS



Seven Elliott generators, rated 656 kva, driven by Worthington gas engines in a recently built natural gasoline plant.



In another new gasoline plant — three Elliott 300 kva generators, driven by Ingersoll-Rand gas engines.

A "natural" IN NATURAL GASOLINE PLANTS

■ Because the name Elliott is ace high in the oil industry, the selection of Elliott generators in the two new gasoline plants illustrated above represents a logical decision, soundly based upon confidence in quality performance.

Elliott Fabri-Steel generators have the crack-proof strength of welded steel in frame and spider, imparting a rigidity that keeps air gap unusually constant. Back of this are a multitude of construction details developed for enduring service and applied by veteran craftsmen. These are factors which give a performance impelling one power company executive to remark "The more we hear of generators generally, the better we like our Elliott units".

ELLIOTT FABRI-STEEL GENERATORS have the extra strength of electrically welded fabricated steel in stator frame and rotor spider . . . extra long life and dependability in taping and insulating of stator coils, extra bracing of windings, silver brazing of damper winding joints . . . extra low cost maintenance in easy air gap adjustment and accessibility for periodic cleaning.

The full story of these generators is covered in Bulletin PB-2000. On request.

ELLIOTT COMPANY Ridgway Division **RIDGWAY, PA.**

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Here, in one of the toughest of all services, where engine load jumps from one extreme to the other a thousand times a day, you can learn a lot about engine quality and downright stamina. And because Cooper-Bessemer Diesels are more than a match for this brutal work, you'll meet them time and again in big, hardworking draglines.

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